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AIR POLLUTION ABSTRACTS

REPRODUCED BY
**NATIONAL TECHNICAL
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U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Programs

AIR POLLUTION ABSTRACTS

Vol. 3, No. 9

September 1972

Prepared by:

Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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INTRODUCTION

This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS—HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS—PLANTS AND LIVESTOCK

Effects on vegetation—crops, trees, other plants—and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS—MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

21919

APTIC NO. 40992

Mie Prefecture (Japan)

WHITE PAPER ON PUBLIC NUISANCE. (Kogai hakusho). Text in Japanese. 236p., 1971.

The budget for pollution controls was \$1,650,000.00 for the year of 1971, almost 25 times that for the previous year. Sulfur oxide concentration in highly polluted areas decreased, for instance, from a yearly average of 0.081 ppm in 1967 to 0.039 ppm in 1969 in Yokkaichi city. However, that in the less polluted areas was increasing. From the results of 10 detecting stations, there was a trend of increases of particulate concentrations. An investigation on the effect of smoke on lung functions of school children in the area revealed that the higher the degree of pollution, the greater the effect; the registered victims of pollution increased to 719 at the end of Sept. 1971. Pollution control regulations were revised in 1968. Under these new regulations, 228 factories and 514 facilities were confirmed as polluters in the area at the end of March of 1971. Future plans on air pollution control are also discussed.

21920

APTIC NO. 40993

Tokai Metropolitan Government (Japan), Dept. of Public Nuisance

REVIEW ON ENVIRONMENTAL POLLUTION IN TOKAI CITY-1970 (Tokai-shi no kogai gaikyo, showa 45 nen). Text in Japanese. 102p., July 1971.

There were 22 detecting stations in the city of Tokai. The sulfur oxides concentrations decreased from 1969 to 1970 at almost all detecting stations. The average concentration of sulfur trioxide measured by the lead dioxide method was 2.12 mg/100 sq m/day. The average particulate concentration of five major stations was 12.39 tons/sq km/mo. There were 78 complaints about pollution, including 49 complaints on air pollution in 1970. Health examinations on 12,758 residents revealed that 1.27% had chronic bronchitis. Approximately 2.5% of 756 residents who had self-conscious symptoms also had obliterating respiratory obstacles.

21921

APTIC NO. 40994

Nagoya Municipal Office (Japan)

PRESENT STATUS AND POLICY OF ENVIRONMENTAL PROTECTION - DATA COLLECTION. (Kogai no genkyo to taisaku - shiryoshu). Text in Japanese. 123p., Oct. 1971.

The pollution control for sulfur oxides has been improved since 1969. Measurements revealed that it was higher in winter, and at some locations it exceeded 0.05 ppm in 1970. The average concentration of 12 locations measured by the lead dioxide method was 2.18 mg/100 sq cm/day. The average particulate concentration was 9.12 tons/sq m/mo, slightly higher than 1969. The highest daily carbon monoxide concentration was 7.8 ppm at one intersection. The average particulate concentration was 0.20 to 0.584 mg/cu m. The pollution control budget was set at \$1,200,000 for the year of 1971. Federal regulations for pollution control were: the hourly concentration of sulfur oxides should be less than 0.2 ppm; more than 70% of the days should have average daily concentrations less than 0.05 ppm; more than 88% of the hours should have

hourly concentrations of less than 0.1 ppm; and the hourly average CO concentration for 8 consecutive hours should be less than 20 ppm, and less than 10 ppm for 24 consecutive hours.

21922

APTIC NO. 40996

Ministry of Agriculture and Forestry (Japan), Dept. of General Affairs

DATA ON BAD ODOR INVESTIGATIONS. (Akushu kan-kei kento shiryo). Text in Japanese. 330p., 1971.

National investigations revealed that complaints on air pollution increased by 29% and those on offensive odor increased by 42% from 1968 to 1969. No regulation had been established to control the offensive odor until the 65th National Assembly. Thirteen compounds belonging to four categories including sulfur compounds, nitrogen compounds, hydrocarbons, and aliphatic compounds were listed as the offensive odors. The regulations were put into action on June 1, 1971. Five methods for the detection of odors are described. Odor thresholds of various chemicals and five major deodorizing methods are also listed and described.

21923

APTIC NO. 41004

Chiba Prefecture (Japan)

WHITE PAPER ON ENVIRONMENTAL POLLUTION IN CHIBA PREFECTURE. (Chiba-ken kogai hakusho). Text in Japanese. 525p., Dec. 1971.

Fifteen alarms were issued from June to August in 1971 due to the high photochemical smog. There were approximately 600 factories and 1200 facilities suitable for the application of the air pollution control regulations. The fuel consumption increased six times in the past 5 years, and the amount of sulfur oxides discharged reached 18,731 N cu m/hr in 1970. The particulate concentration was 20 to 30 tons/sq m/mo in industrial area, 10 to 15 tons/sq m/mo in residential area. The carbon monoxide concentrations ranged from 0.80 to 2.66 micrograms/cu m. Experiments conducted by the medical school of Chiba University revealed that the school children in polluted area averagely had lower breathing capacities. Results from investigation on infants in certain areas showed that infants with respiratory symptoms were three times higher in polluted areas. Injuries to plants including crops and fruit trees were significant. New policies on air pollution control were issued in 1970, effective Sept. 28, including the standards for various pollutants.

21924

APTIC NO. 41010

SMOG: IS IT GETTING BETTER? APCD (Air Pollut. Control Dist.) Dig., 11(5):1, May 1972.

A comparison of emissions from motor vehicles and stationary sources since 1940 is presented. Emissions of pollutants from stationary sources under jurisdiction of the Los Angeles Air Pollution Control District have been decreasing since 1955, and emissions from motor vehicles under the jurisdiction of the Air Resources Board recently have begun to decrease even though Los Angeles experienced astronomical growth during the period. It is expected that with a continued effective motor vehicle emission control program in which more effective controls are required for each succeeding model year, and due to the replacement of older vehicles with the newer low-emission vehicles, photochemical smog and the resultant manifestations

such as reduced visibility and eye irritation will gradually decrease to the point that this form of air pollution will no longer constitute a major problem in Los Angeles County.

21925

APTIC NO. 41012

Nagoya Municipal Office (Japan)

ON ENVIRONMENTAL POLLUTION PROBLEM.

(5Kogai ni suite). Text in Japanese. 22p., Aug. 1971.

This book was published for grade school and junior high school students. Sources of pollutants including electrical plants, chemical plants and steel plants were listed with their major pollutants. Sulfur dioxide results from the combustion of sulfur-containing heavy oil, and was the major pollutant from factories. The SO₂ gas caused injuries to eyes, throat and lungs. It also injures plants and vegetables. Automotive exhaust gases include carbon monoxide and nitrogen oxides. The affinity of CO to hemoglobin is 200 times greater than that of oxygen, therefore, high concentrations of CO cause headaches and dizziness. Photochemical smog results from the nitrogen oxides in air. Air pollution control in terms of factory fuel control and automotive exhaust gas control were discussed. The present status of pollution in Nagoya city was given by listing the pollutant concentrations detected at many detecting stations.

21926

APTIC NO. 41035

Tokyo Metropolitan Government (Japan) Itabashi Ward Office

ANNUAL REPORT ON ANTI-POLLUTION BUSINESS -

1970. (Kogai taisaku jigyo nenpo). Text in Japanese. 95p., Dec. 1971.

An air/fuel ratio higher than 14.7, almost no carbon monoxide was evolved from engines. However, the air/fuel ratios of automobile engines were usually under 14.7, therefore, the formation of carbon monoxide could not be prevented. Sixty percent of the hydrocarbons in air are from automotive exhaust gas, whereas the 40% result from other reasons such as blow-by gas. Lead and CO concentrations were measured at 27 intersections in Tokyo, and the average CO concentration was 9.3 ppm, while seven intersections had hourly average lead concentrations for 10 consecutive hours higher than 5 micrograms/cu m. There are 5047 factories in this ward, of them 45 factories were tested for harmful pollutants in 1969. All were found having more than one harmful pollutant. Air pollution control regulations on car exhaust gas were revised from Jan. 24, 1971. Controls on factory pollution has also been reinforced.

21927

APTIC NO. 41451

URBAN GAS BOILERS IN THE LIMELIGHT-REEVALUATION OF CLEAN ENERGY THERMAL MANAGEMENT TECHNIQUE. (Kyakko o abiru toshi gasudaki boira-kurin enerygi mi yoru netsu kanri gijutsu o minaso). Text in Japanese. Osaka no Sora (Sky Osaka), no. 14:39-54, March 1972.

Heavy oil consumption in Osaka Prefecture in 1970 was approximately 8,000,000 kl, and measurement of pollutant concentration revealed that 29.5 t/yr of sulfur oxides and 12.4 to 20 t/mo/sq km of particulates were generated. The amount of nitrogen oxides generated in that year was estimated at almost the same as that of SO_x. In order to protect the future environment, it was necessary to have an 80 m high stack for a boiler with a capacity of 10 t/hr burning oil with a sulfur content of less than 0.3 wt%. The cost for the reduction of every 0.1% of sulfur content was estimated at about \$0.17/t of steam. An investigation conducted on 205 factories in the area in 1971 showed that the cost for pollution control increased 40%. The operation costs for boilers using different kinds of fuel were compared.

21928

APTIC NO. 41453

Woodrow Wilson International Center for Scholars, Washington, D. C.

THE HUMAN ENVIRONMENT. VOLUME 1: BIBLIOGRAPHY 1972. *Environment Series* 201, 178p., March 1972. 911 refs.

This is the first annotated bibliography of contemporary official and related statements of the problems of the human environment. It was printed specifically for the United Nations Conference on the Human Environment scheduled for Stockholm in June of 1972. Documents of the United Nations and other international organizations both preparatory to the conference and otherwise, as well as the documents of non-governmental organizations are included.

21929

APTIC NO. 41586

WANTED: A NON-POISONOUS CAR ENGINE. *Australasian Engr.* (Sydney), 1972:21-22, April 1972.

A liquefied petroleum-fueled automobile is being tested in Sydney, Australia as part of a program to reduce automobile emission pollutants. The main pollutants produced by the commonly used petroleum fueled engine are carbon monoxide, unburned hydrocarbons, and oxides of nitrogen. Of these, carbon monoxide is the most dangerous. Tests conducted on the experimental liquid petroleum engine revealed that carbon monoxide was reduced by 75% when idling, 84% when decelerating, and 86% when accelerating. After 14,062 miles of testing, the engine was stripped down and examined. The examination revealed a marked reduction in engine wear because there was no pollution of engine oil by unburned gasoline which could by-pass the piston rings. Furthermore, the minimal oil contamination enabled the engine to operate for at least 15,000 miles without changing the crankcase oil. The liquefied petroleum gas equipment used on the test vehicle weighs about 262 lbs, and includes two cylinders weighing 112 lbs, 120 lbs of gas, and 30 lbs of additional equipment. One load of gas gives a range of about 400 miles. The cost of converting a car for liquefied petroleum gas use is from \$230-250; experience has shown that about 50,000 miles of operation would offset the conversion cost.

21930

APTIC NO. 41648

Bureau of Mines, Mineral Supply

RESTRICTIONS ON THE USES OF COAL. 61p., June 1971.

NTIS: PB 202168

Although the United States has virtually unlimited reserves of coal of all ranks, the future availability of domestic coals may be limited by a variety of factors. Coals vary greatly in chemical and physical properties and one rank of coal cannot be generally substituted for another. A problem of immediate concern to electric-utility plants in some areas is the procurement of low-sulfur coals with ash-fusion temperatures suitable for use in wet-bottom furnaces. It appears that demand for such coals in the near future will far outweigh supply. Manpower needs of the coal industry are expected to increase substantially during the next decade and the industry is faced with the problem of attracting and recruiting the needed manpower at a time when its image has grossly deteriorated because of recent mining disasters, health problems of miners, and undesirable working conditions. It is estimated that the number of additional miners who will be required in 1985 will range from a low of 26,000 to a high of 184,000. Non-rail modes of coal transportation will, in all probability, be adequate to meet the demands placed upon them. Railroad transportation will not be adequate to meet the demands on it unless the supply of railroad hopper cars is increased. Coal preparation and cleaning plant capacity must be expanded greatly in order that the coal industry can meet the more severe requirements being imposed upon coal quality. Construction of coal preparation plants is slow, and considering the small number of companies

involved in this type of construction, construction times might be expected to increase in the future. The Federal Coal Mine Health and Safety Act of 1969 is expected to restrict coal availability, principally because it is expected to lower productivity and increase manpower requirements. (Author summary modified)

21931 APTIC NO. 41650

Environmental Engineering, Inc., Gainesville, Fla. and PEDCo Environmental Specialists, Inc., Cincinnati, Ohio

BACKGROUND INFORMATION FOR ESTABLISHMENT OF NATIONAL STANDARDS OF PERFORMANCE FOR NEW SOURCES. GRAY IRON FOUNDRIES. *Air Pollution Control Office Contract CPA e0-142, Task 2, 63p., March 15, 1971. 31 refs.*

Gray iron foundries produce metal castings by mixing gray iron, pig iron, scrap, and trace additives. The need for particulate controls is great, but average profits of approximately 6.9% do not provide much margin for elaborate controls. New plants seem to be able to economically justify air pollution control; old plants cannot. All devices now in use are designed to control particulate matter. No attempt is made to control nitrogen oxides, and in many cases emission levels have not been determined. The only sulfur dioxide removal is that which takes place during particulate scrubbing. The concentrations of SO₂ in top gases from cupola furnaces range from 300 to 470 ppm. Quantitative analyses of fluoride emissions are not reported. Reduced S compounds are not generated in any gray iron processes. Odors originating from the oil, wax, and resins used in molding have not been measured. Uncontrolled cupola melting results in variable opacity which approaches 100%. Electric arc melting also produces a visible plume. Other processes have plumes during charging and when fluxes are added. Four foundries are either planned or in production within stringent particulate emission regulations; eleven foundries operate with 99% efficient controls. Emission limits recommended for new or modified sources are: sulfur oxides-500 ppm, NO_x-325 ppm, particulates-0.03g/scf, and visible emissions-less than 10% equivalent opacity. Control methods include venturi scrubbers, fabric filters, baghouses, afterburners, and electrostatic precipitators.

21932 APTIC NO. 41654

Aktiebolaget Atomenergi, Stockholm (Sweden), Guidance Group

AIR POLLUTION FROM MOTOR VEHICLES 123 refs. *Translated from Swedish. 202p., 1971.*

Vehicles are responsible for roughly half of the total amount of air pollution which is emitted in Sweden. Such pollutants are primarily carbon monoxide, hydrocarbons, nitrogen oxides, soot, and lead compounds. Extensive measurements of exhaust pollutants were carried out in Stockholm and in other cities. The fast growth of the number of vehicles in Sweden has led to Sweden having the highest number of motor vehicles per inhabitant in Europe. An estimation was made of the average emission per motor vehicle of the various exhaust pollutants at an exhaust gas laboratory. Results are summarized for both gasoline-fueled and diesel-fueled vehicles. Possible control measures for reducing air pollution by motor vehicles were studied, including town and traffic planning, technical measures on gasoline-fueled vehicles, altered composition of fuels, technical measures on diesel-fueled vehicles, enactment of regulations, and alternatives to the internal combustion engine. The effects of proposed emission standards and estimated costs were calculated.

21933 APTIC NO. 41655

Aktiebolaget Atomenergi, Stockholm (Sweden), Guidance Group

AIR POLLUTION FROM MOTOR VEHICLES APPENDICES TO FINAL REPORT K 1971:1 41 refs. *Translated from Swedish. 41p., 1971.*

Tasks and equipment of a mobile and a stationary vehicle exhaust emissions laboratory are described. Reports from individual working groups involved in the study and technical memoranda are listed. Statistics are presented from studies of air pollution measurements in street air, vehicle specifications, and additives in motor spirit. The reports of several studies, including an evaluation of vehicle exhaust pollutants from the point of view of environmental hygiene, a study of city and traffic design to reduce pollutant levels, the effects of action against vehicle exhaust air pollution, and comparisons between test methods and limit values. Symbols and terms are defined. 0

21934

APTIC NO. 41670

Office of Air Programs, Research Triangle Park, N. C., Air Pollution Technical Information Center

HYDROCHLORIC ACID AND AIR POLLUTION: AN ANNOTATED BIBLIOGRAPHY *Pub-AP-100, 110p., July 1971. 164 refs.*

GPO: 5503-0019

The bibliography contains 164 abstracts of documents and articles on hydrochloric acid. An author index, a title index, a subject index, and a geographical index follow the abstracts. The articles are grouped according to the following classifications: general, emission sources, atmospheric interaction, measurement methods, control methods, effects-human health, effects-plants and livestock, effects-materials, effects-economic, legal and administrative, standards and criteria, and basic science and technology.

21935

APTIC NO. 41784

DISCUSSION OF THE THEMES IN GROUP FOUR: ODOR PROBLEMS OF INDUSTRY. (*Diskussionen zu Themen der Gruppe 4 (Geruchsprobleme der Industrie). Text in German. Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no 35-113, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Duesseeldorf, West Germany), March 18, 1971.*)

Odors are frequently emitted without being observed by valves and safety valves which have become leaky. Large quantities of low boiling hydrocarbons escaped from a sampling point in a refinery in Lyon. The gas cloud ignited when a cigarette was lit several hundred meters away and caused an explosion in the refinery. The completeness of the combustion in a flare depends mainly on the residence time. Addition of oxygen does not always increase the efficiency. 0

21936

APTIC NO. 41980

Japan Environmental Agency, Noise and Odor Control Div.

AN OUTLINE OF THE PRESENT STATE OF AIR POLLUTION, NOISE, VIBRATION, AND OFFENSIVE ODOR, AND COUNTERMEASURES AGAINST THEM. (*Wagakuni ni okeru Taikosen oyobi Soori, Shindo, Akushu koga no Genjo to taisaku no gaiyo*) Text in Japanese 71p., Oct. 1971.

Changes and main causes of air pollution are described. The state of air pollution according to air quality measurements is also described. Polluted areas in Japan such as Tokyo, Kanagawa, Nagoya, Yokkaichi, Osaka, Amagasaki, and Kitakyushu are described. Health, agriculture, and forestry, and financial damage, their condition according to air pollutants, and relief systems for health damage are described. Control plans, regulations, legislation, air quality standards, and countermeasures against photochemical smog and auto exhaust gases are discussed. The national air sampling network, air pollution observation and survey system in districts, air pollution observation and survey system in large territories, basic policies of preventive plants, research programs, noise, vibration, and odor are mentioned.

21937

APTIC NO. 42074

Japan Environmental Agency, Noise and Odor Control Div.

REPORT OF RESEARCH ON ACTUAL CONDITION OF OFFENSIVE ODOR POLLUTION AND OF ITS TREATMENT. (*Akushu kogai shori jokyo jittai chosa hokokusho*). Text in Japanese. *Kankochō Kogaisenmon Shiryo* (Public Nuisance Gaz.), no. 3:2-33p., May 1972.

The actual condition of offensive odor pollution and its treatment was studied by questionnaires in Dec. 1971 in each urban and rural district of the country. The reaction to enforcement of the prevention law against offensive odor, which was issued in June 1971, was also studied. Responses to questionnaires are summarized concerning the following items: institutes dealing with offensive odor pollution; regulations against offensive odors; number of cases of offensive odor classified by industry; instances of offensive odor pollution; conditions of treatment against offensive odors; number of complaints about air and water pollution handled by regional groups; number of complaints about offensive odors received by villages and municipalities of each prefecture; actual conditions of research or investigation on offensive odors.

21938

APTIC NO. 42130

HIGH SPEED ELECTRIC CAR. *Elec. Rev. (London)*, 190(2):58-59, Jan. 14, 1972.

A speed of approximately 150 mile/hr was achieved recently with a battery powered Opel car, and an average speed of 63 miles/hr was obtained over a distance of 28 miles on one battery charge. The trial runs which were conducted at the Hockenheimring in Germany were organized jointly by Opel, Bosch, Varta, and other interested parties as part of a development program to assess the problems and operating limits of electrically driven cars. The battery was a standard nickel-cadmium type commonly used in aircraft, having a capacity of 400 Ah at a 5-hour rate. It comprised 280 cells, and the terminal voltage was 260 V at a discharge current of 400 A.

21939

APTIC NO. 42156

Public Nuisance Control Committee (Japan)

BASIC POLICY FOR ESTABLISHING BAD ODOR MATERIALS AND THE RANGE OF BAD ODOR REGULATION STANDARDS (PLANS). (*Akushu busshitsu no shitei oyobi akushu kisei kijun no hani no settei nado ni kansuru kihonteki hoshin ni tsuite*). (Toshima). Text in Japanese. *Kogai to Taisaku* (J. Pollution Control), 8(6):597-599, June 1972.

Nitrogen compounds such as ammonia, sulfur compounds such as methyl mercaptan, and compounds such as aldehydes, fatty acids, and hydrocarbons are considered as sources of bad odors. The bad odor control regulations state that the bad odor substance is a major component that generates offensive odor and is detectable in the air. The substances that fit the above regulations are ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethyl amine. There are six ranking degrees for the intensity of odors, namely, 0, 1, 2, 3, 4, 5, and 2.5 and 3.5 are stated as the lower and upper threshold value. For ammonia, they are 1 ppm and 5 ppm, for methyl mercaptan, 0.002 ppm and 0.01 ppm, for H₂S, 0.02 ppm and 0.2 ppm, for methyl sulfide, 0.01 ppm and 0.2 ppm, and for trimethyl amine, 0.005 ppm and 0.07 ppm. Detection methods for these odors are tabulated.

21940

APTIC NO. 41077

Amann, C. A., W. R. Wade, and M. K. Yu

SOME FACTORS AFFECTING GAS TURBINE PASSENGER CAR EMISSIONS. *Preprint, Society of Automotive Engineers, Inc.* New York, 18p., 1972, 22 refs. (Presented at the Automotive Engineering Congress Detroit, Mich., Jan. 10-14, 1972, Paper 720237.)

An attempt is made to put into proper perspective the relationships among the vehicle, the thermodynamic cycle, and the combustion process as they relate to exhaust emissions from a gas turbine powered passenger vehicle. The influence of such factors as car size, installed power, regeneration, and other cycle variables on level road load fuel economy, and on the production of oxides of nitrogen and carbon monoxide, are examined. In limited checks against experimental data, the mathematical model of the combustor used in this study proved to be a reliable indicator of emission trends. The calculated emission levels are not final, however, with deficiencies subject to improvement as new combustor concepts are developed. (Author abstract modified)

21941

APTIC NO. 41213

Andreyev, V. I., K. A. Morozov, and B. Ya. Chernyak

MIXTURE DISTRIBUTION BY CYLINDERS AND TOXICITY OF GASOLINE ENGINE EXHAUST GASES.

Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukh Gorodakh Vykhopnymi Gazami Avtomob. Proc. Symp., 2nd, 1971, 6 refs. Translated from Russian, 15p.

The effect of the nature and the magnitude of the difference in the air-fuel ratio in individual cylinders on the toxicity of exhaust gases is reviewed and the results of tests of a one-cylinder experimental installation and two multicylinder carburetor engines are presented. One engine was a V-type 6-cylinder with a compression ratio of 9 and the other was a 4-cylinder with a compression ratio of 7.5. The toxicity of the combustion products is determined by the carbon monoxide content at heavy loads and when running on rich mixtures. The effect of the nitrogen oxides begins to dominate when the mixture is made lean. The hydrocarbon content in the exhaust gases at full or near full loads is negligible. The difference in the concentration of toxic substances for the multicylinder engine and the one-cylinder installation can be the result of nonuniformity in the air-fuel ratios in the individual cylinders. Calculations were made to determine the association between nonuniformity in mixture distribution by cylinders and the toxicity of the combustion products.

21942

APTIC NO. 40959

Badin, Elmer J.

SMOKE SUPPRESSANT COMPOSITIONS FOR PETROLEUM FUELS. (*Citrus Service Oil Co., Bartlesville, Okla.*) U. S. Pat. 3,639,109 6p., Feb. 1, 1972, 8 refs. (Appl. Jan. 2, 1968, 20 claims.)

Attempts have been made to reduce the soot formed during the oxidation of liquid hydrocarbon fuels, and certain metallic smoke suppressant mixtures have been employed in compression ignition engines. An objection to these mixtures is that they leave deposits in engine crankcases, are expensive to produce and package, and can form undesirable combustion products. Previous attempts to incorporate various materials into fuels have resulted in a tendency to lower the octane number of gasoline or the cetane number of diesel fuels, while reducing the stability of fuel to oxidation and using materials susceptible to emulsification and storage. A liquid fuel composition having reduced soot and smoking characteristics is disclosed. It comprises a major proportion of a liquid hydrocarbon fuel and a minor proportion of Group IIA and Group IIB metal salts of carboxylic acids. A preferred fuel composition is from 0.1 to 0.6% by weight of barium and zinc 2-ethylhexanoates admixed in diesel fuel, wherein the weight ratio of barium to zinc is about 10 to 1. Further improvement in soot and smoke reduction is obtained in hydrocarbon fuels when an ether is additionally incorporated into the salt and fuel mixture. (Author abstract modified)

21943

APTIC NO. 41724

Railey, R. L.

A PROPOSED NEW CONCEPT FOR A SOLAR-ENERGY CONVERTER. *J. Eng. Power*, 94(2):73-77, April 1972. 7 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Sol-1.)

There is a need for a new concept in advanced solar direct energy conversion research if technology is to have a significant long range terrestrial beneficial effect on a large percentage of humanity. By recognizing the importance of pyramidal or conical rough structures in human, animal, and insect eyes, the electromagnetic wave energy converter concept was advanced for creating large area man-made solar energy absorber-converters. Such converters would be based on wave principles, be of a rough surface texture with multiple pairs of tapering absorber elements with each pair optimized to absorb energy within a given part of the sun's power spectrum, be made of metallic, dielectric, or other suitable material for absorber elements, contain a suitable conversion means for use at light frequencies, and yield a d-c output. The absorber concept appears preliminarily valid at microwave frequencies based on early tests and extensions of antenna art. Extension of the overall concept to optical frequencies appears to have been achieved in nature in the eyes of humans, animals, and insects. (Author summary modified)

21944

APTIC NO. 41562

Baryshev, V. I.

FACTORS DETERMINING THE AMOUNT AND COMPOSITION OF FLUE GASES FROM BURNING ASH COAL. (Prichiny obuslovlivayushchiye velichinu unosov pri szhigani ASH). Text in Russian. *Teplotekhnika*, no. 5:80-81, 1972. 8 refs.

Chemical composition of different fractions of combustion products from low-activity ASH coal was determined, and different factors influencing the combustion were investigated. ASH (coal) is an inert coal variety. The organic content, 65-95% of which was found in the fraction above 50 micron, was present in the form of unburned particles of high-temperature coke, with carbon to hydrogen ratios ranging from 0.0062 to 0.0189. The organic content of the 0-50 micron fraction was 4.8-34.5%. The total combustible content in the residue accounted for 10.8-25.3%, equaling 4-7% of the original coal dust. Particles smaller than 200 micron lost all their volatile content, while such above 200 micron had no time to heat up properly. The combustible residue was due to the incomplete combustion of the largest coke particles as a result of unsatisfactory contact with oxygen in the relatively cool tail part of the flame. The combustion can be improved by applying finely ground coal dust and intensified turbulence. The coarsening of the fractions with high organic content can be utilized as a means of increasing the efficiency of the afterburners by feeding them coarsened fractions (above 40-50 micron) instead of the total residue.

21945

APTIC NO. 41350

Beatty, James R. and David S. Kircher

FRANKLIN COUNTY, OHIO AIR POLLUTANT EMISSION INVENTORY. Air Pollution Control Office, Durham, N. C., Div of Air Quality and Emission Data, Office of Air Programs, Pub-APTD-0814, 53p., Dec. 1970.

NTIS: PB 207688

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, industrial processes, and evaporation losses. Sources that emitted large quantities of air pollutants were considered

individually and located specifically within the area. An estimated 500,000 tons of the five major pollutants were emitted in the area in 1968, 29,800 tons of sulfur oxides, 40,400 tons of particulates, 339,000 tons of carbon monoxide, 58,200 tons of hydrocarbons, and 33,300 tons of nitrogen oxides. Combustion of fossil fuels accounted for 92% of the sulfur oxides. Coal combustion also accounted for 91% of the particulate emissions. Motor vehicles contributed 93% of the carbon monoxide, 67% of the hydrocarbons, and 64% of the nitrogen oxides. About 36% of the nitrogen oxides were produced by the combustion of coal, oil, and gas at stationary sources.

21946

APTIC NO. 41757

Bockris, J. O. M.

A HYDROGEN ECONOMY. *Science*, 176(4041):1323, Jun. 23, 1972. 2 refs.

The medium of energy transport from an atomic reactor to sites where energy is required should not be electricity, but hydrogen. The term hydrogen economy applies to the energetic, ecological, and economic aspects of this concept. The concept envisages atomic reactors held on platforms floating on water. They are in water sufficiently deep to make heat dissipation easy. The electricity that they make would be converted on site to hydrogen and oxygen by electrolysis. The hydrogen would be piped to distribution stations and thereafter sent to factory and home. Reconversion to electricity would occur in on-site fuel cells, the only side product being pure water. The advantages and disadvantages of the concept are listed. One of the advantages is that the hydrogen would run trucks, cars, ships, and trains by means of fuel cell battery combinations and electric motors. Transportation would be nonpolluting. Aircraft could run on liquid hydrogen by using jet transducers. The emission of carbon dioxide, nitric oxide, and unsaturated hydrocarbons would be avoided. Those processes in chemical technology that involve continued emissions could be converted to fumeless electrochemical processes. 0

21947

APTIC NO. 42031

Bogh, P. and R. Musel

THE STRUCTURE AND OPERATING FEATURES OF COOLING TOWERS FOR NUCLEAR POWER PLANTS. (Aufbau und Betriebsweise von Kuehltaurmanlagen fuer Kernkraftwerke). Text in German. *Chem. Pundschau (Solothurn)*, 25(9):217-219, March 1972.

The structure and operating features of cooling towers, as applied to nuclear power plants, are described. The efficiency of evaporative cooling towers is determined by the relative humidity of the air. Heat exchange occurs through heat convection between air and water, as well as through evaporation. As the temperature of the inside and outside air is the same, a draft is generated by the different densities of dry and humid air. Evaporative cooling towers used at nuclear power plants apply gravitational water distribution and cooling surfaces formed by several layers of vertical grates. The cooling air is admitted in counter current. Hyperbolic, compact structures and constant cooling water flow are some of the features of modern cooling towers. The polyphosphates, used in the treatment of the additional water, have been replaced by organic additives. The application of baffles and current distribution resulted in highly efficient droplet separation. A minimum baffle angle of 30 degrees guarantees efficient separation of droplets with a minimum diameter of 100 micron, while increased flow rates above 3 m/sec do not result in noticeable improvement. Droplets below 20 micron escape the cooling tower without forming precipitation.

21948

APTIC NO. 42079

Brueckner, Hermann and Eberhard Wittchow

COMBINED STEAM AND GAS TURBINE PROCESSES, INFLUENCE ON DESIGN AND OPERATION OF STEAM GENERATORS. (Kombinierte Dampf-Gastur-

binen- Prozesse Einfluss auf Auslegung und Betrieb der Dampferzeuger). Text in German. *Energie Tech.*, 24(5):147-152, May 1972.

The combined steam and gas turbine process with steam generator uses the oxygen-rich gas turbine waste gases as combustion air for the steam generator. The flue gases are cooled by high-pressure or low-pressure air. The combination of a gas turbine with utilization of waste heat has the advantage of requiring a simple design. It is suitable for industrial plants, remote heating plants, and for electrical power peak loads. If the gas turbine waste heat alone is used for steam production without an auxiliary burner, a degree of efficiency of about 39% is achieved at a capacity ratio of steam turbine to gas turbine of 1 to 2.6. If the oxygen in the gas turbine waste gas is used for combustion of natural gas with an air surplus of 5%, a capacity ratio of steam turbine to gas turbine of about 6 to 1 or 7 to 1 is achieved. The degree of efficiency of such plants is much higher than that of conventional steam processes. The complete integration of the gas turbine process into the steam turbine process keeps investment costs low. The capacity ratio of steam turbine to gas turbine is between 4.5 to 1 or 5 to 1. The degree of efficiency at full load is about as high as that of plants with subsequent steam generators, at partial load it drops faster than with any of the other methods.

21949

APTIC NO. 42092

Cherry, W. R.

THE GENERATION OF POLLUTION-FREE ELECTRICAL POWER FROM SOLAR ENERGY. *Trans. ASME (Am. Soc. Mech. Engrs.)*, 94(2):78-82, April 1972, 9 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28 - Dec. 2, 1971, Paper 71 WA/Sol-2.)

It is estimated that the total U. S. electrical power needs for 1990 will amount to about 6.6 times 10 to the 12th KWH/yr. Except for hydroelectric installations, the present means of generating power produce undesirable by-products of carbon dioxide, carbon monoxide, nitrous oxides, fly ash, water vapor and large amounts of waste heat which must be vented into the atmosphere or dumped into rivers or lakes. Assuming a 7% conversion efficiency and 70% sunshine hours in the southwestern U.S., about 31,500 sq mi of solar array could generate the total energy needs of the nation. This represents 1% of the land area of the continental United States. If ways could be found to intercept the solar energy entering the upper atmosphere, then over 3 MKWH of power could be generated daily during the summer months and over 2 MKWH during the winter from a one sq mi station. The ultimate method of generating vast quantities of electrical power would be from a series of synchronous satellites. A one-square-mile solar array power station, built after techniques are developed to produce low cost solar arrays and batteries, would cost about \$100 million to build, operate, and maintain over a 20-year period. Net income per sq mi over a 20-year period is estimated at \$26 million. Several technical problems requiring developmental work are discussed.

1950

APTIC NO. 41604

Cipriano, Joaquin Mendes

A FAST AND PRECISE METHOD FOR THE DETERMINATION OF LEAD IN GASOLINES. (*Metodo rapido e preciso para determinacao do chumbo nas gasolinas*). Text in Portuguese. *Rev. Port. Quim.*, 5(3):129-132, 1963, 2 refs.

A method for the determination of tetraethyl lead in gasolines by means of direct titration with a disodium salt of EDTA reagent is presented. Lead compound extracts obtained according to the American Society of Testing and Materials procedure are collected into a 200 ml volumetric flask and brought to volume with distilled water at 20 C. Fifty ml from this solution are then treated with 2.0 g of tartaric acid, and an excess of concentrated ammonia after neutralization in the

presence of litmus paper. Titration is performed with a standard solution of the EDTA reagent in the presence of eryochrome Black T as an indicator and following addition of 1.0 ml of magnesium chloride reagent. A small amount of potassium cyanide should be added to gasoline extracts containing manganese metal additives such as nickel, cobalt, cadmium, to prevent interference. Potassium cyanide cannot prevent interference from calcium or magnesium. Comparison with the ASTM method which is a gravimetric procedure lasting 24 hrs, opposed to the above technique which is performed within 1.0 hr and with the French Petroleum Institute method indicated the new method to be of satisfactory accuracy.

21951

APTIC NO. 40981

Cocnen, R., W. Fritsch, S. Goetzmann, H. Kesberger, J. Laaghein, H. D. Piotrowski, and R. Schladtitz

CHEMICAL-TOXICOLOGICAL PROBLEMS OF ENVIRONMENTAL PROTECTION. (*Chemisch-toxikologische Probleme des Umweltschutzes*). Text in German. *Naturwissenschaften (Berlin)*, 59(3):106-111, March 1972, 2 refs.

In May 1970, the Federal German Government commissioned the Study Group for Systems Research, Heidelberg, to carry out a study of environmental pollution. Questionnaires were sent in two stages to representatives of university departments, independent research organizations, industry, and local authorities (182 questionnaires sent, 95 replies received). Estimates are made of the contributions to air pollution from industrial, domestic, and traffic sources; the main pollutants are sulfur and nitrogen oxides, carbon monoxide, dusts, and aerosols containing noxious substances, particularly lead. Methods of garbage disposal were reviewed as well as pollution due to industrial and sewage effluents, and the effects of pesticide usage in agriculture. The section on the toxic effects of pollutants on humans and ecosystems revealed how little is known in this field. Of the 3.6 million tons of SO₂ emitted in 1969, 44% came from power plants, 15%, by domestic heaters; and the remainder, from industrial or other firing systems. Four million tons of dust was emitted in 1969. Of the 8 million tons of CO, 90% came from traffic which also solely accounted for the 7000 tons of lead emitted in 1969, and for 50% of the 2 million tons of hydrocarbons as well as for 45% of the 2 million tons of NO_x. In addition to these pollutants, such substances as fluorine, hydrogen sulfide, carbon disulfide, and organic compounds such as mercaptans and aldehydes must be considered annoying and possibly dangerous.

21952

APTIC NO. 41373

Davis, W. E.

NATIONAL INVENTORY OF SOURCES AND EMISSIONS. BARIUM, BORON, COPPER, SELENIUM, AND ZINC. COPPER. SECTION III. Davis (W. E.) and Associates, Leawood, Kans., Office of Air Programs Contract 68-02-0100, 72p., April 1972, 25 refs.

The flow of copper in the United States was traced and charted for the year 1969. The consumption was 3,058,000 tons, while primary and secondary production totaled 3,118,000 tons. Imports and exports were 131,000 tons and 200,000 tons, respectively. Emissions to the atmosphere during the year were 13,680 tons. About 64% of the emissions resulted from the metallurgical processing of primary copper, and about 20% from the production of iron and steel. The combustion of coal was the only other significant emission source. Emission estimates for mining, production of primary and secondary copper, and reprocessing operations are based on data obtained by personal contact with processing and reprocessing companies. (Author summary)

21953

APTIC NO. 41374

Davis, W. E.

NATIONAL INVENTORY OF SOURCES AND EMISSIONS. BARIUM, BORON, COPPER, SELENIUM,

AND ZINC. SELENIUM. SECTION IV. Davis, (W. E.) and Associates, Leawood, Kans., Office of Air Programs Contract 68-02-0100. 56p., April 1972. 7 refs.

The production and use of selenium in the United States was traced and charted for the year 1969. The consumption was 728 tons, while primary and secondary production was only 630 tons. Imports, principally from Canada, totaled 273 tons. Emissions to the atmosphere during the year were 986 tons. The emissions that resulted from the combustion of coal were about 65% of total emissions, and those due to the manufacture of glass were nearly 21%. Emissions from metallurgical processing of nonferrous metals and the burning of fuel oil were 9% and 7% respectively, while all other emissions were less than 1% of the total. Emission estimates for the manufacture of glass and metallurgical processing are based solely on data obtained from industry. Emissions due to the combustion of coal and fuel oil are based on the analytical results obtained from relatively few samples. 0

21954

APTIC NO. 41643

Dewell, D. L.

HANDLING VINYL CHLORIDE EMERGENCIES. RECOMMENDATIONS FOR HANDLING VCL TANK CAR EMERGENCIES. Preprint, American Inst. of Chemical Engineers, New York, 14p., 1971. (Presented at the American Institute of Chemical Engineers National Meeting, 68th, Houston, Tex., March 1-3, 1971.)

Modeling indicates that the combustion of vinyl chloride monomer with oxygen can produce phosgene gas. This would not be likely in air. Burning a tank car load, 200,000 lb, of VCM could produce, under the most unfavorable conditions of atmosphere and wind, a ground level concentration of hydrogen chloride of about 5 ppm to a distance of 10,000 ft. When VCM is burned in air, an almost one for one yield of hydrogen chloride results. The other combustion products are carbon monoxide, carbon dioxide, and water vapor. Procedures for handling of VCM accidents, both rail and marine, are outlined.

21955

APTIC NO. 41273

Dmitriyevskiy, A. V., V. F. Kamenev, K. A. Morozov, B. Ya. Chernyak, L. S. Zolotarevskiy, and N. I. Ignatovich

TOXIC CHARACTERISTICS OF MODERN HIGH-COMPRESSION CARBURETOR ENGINES. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukh Gorodakh Vykhopnyimi Gazami Avtomob., Proc. Symp., 2nd, 1971. 10 refs. Translated from Russian. 14p.

Toxic characteristic curves were studied using modern high-speed four-cylinder, four-cycle carburetor engines. Tests were conducted on electric brake test stands. Carbon monoxide, nitrogen oxides, aldehydes, and hydrocarbons were monitored. The external and load characteristic curves were plotted for angle of advance of ignition and mixture composition settings in accordance with the operation of automatic distributor and contact breaker and carburetor systems. Each point on the adjustment characteristic curves was plotted for optimum torque for the angle of advance of ignition. Results showed that the emission of CO decreases when the mixture is made lean; however, NOx increase. Specific toxicity of an engine has little to do with the excess air factor and is in the limits 150 to 250 g/hp. Tuning the engine in terms of the mixture has little effect on toxic emissions during heavy load periods, particularly in the case of high-compression engines. It is possible, at light loads, to reduce the emissions by selecting optimum carburetor adjustment. The effect of nonuniformity of mixture distribution on toxic emissions is ambiguous; development of adjustment characteristic curves reveals that reduced nonuniformity will not always results reduce these emissions.

21956

APTIC NO. 42099

Donohue, J. A., G. C. Hardwick, H. K. Newhall, K. S. Sanvordenker, and N. C. Woelfler

SMALL ENGINE EXHAUST EMISSIONS AND AIR QUALITY IN THE UNITED STATES. REPORT OF THE SAE SMALL ENGINE EMISSIONS SUBCOMMITTEES. Preprint, Society of Automotive Engineers, Inc., New York, 13p., 1972. 9 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720198.)

The work of the Small Engine Emissions Subcommittee of the Society of Automotive Engineers in determining the characteristics of emissions from small utility engines is described. The most reliable of the information presented is that relating to emissions from lawn and garden engines. The population data for this class of engines is relatively well documented, and the estimates of engine life and operation that have been used are generally accepted. On the basis of these data, it can be concluded that pollutant emissions from lawn and garden equipment presently constitute less than 1% of the total annual emissions of hydrocarbons, carbon monoxide, and nitric oxide from all U. S. sources. Due to lack of authoritative information related to the rates of use and modes of operation of snowmobile and chain saw engines, the results presented must be regarded as initial estimates. The results do indicate, however, that as a consequence of the use of relatively large two-cycle engines, snowmobiles may contribute a disproportionately large share of total small engine hydrocarbons. A test procedure for the measurement of small engine exhaust emissions is included. (Author conclusions modified)

21957

APTIC NO. 41959

Duffy, Leo J., Neil R. Everett, James J. Sevcik, and Frank J. Pichl

KEEPING THE LEAD OUT OF UNLEADED GASOLINES. Preprint, American Petroleum Inst., New York, Div. of Refining, 19p., 1972. 2 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 9, 1972, Paper 01-72.)

The decision of American Oil Company to market an unleaded (less than 0.05 g/gal) gasoline on a broad basis in 1970 resulted in many problems of blending and transporting a lead-free product from the refinery to the motorist and keeping it lead-free in a system full of lead. Their solution or minimization is discussed, including analytical methods used to determine lead at this level; monitoring lead at the refinery; preventing contamination in transportation of the gasoline by pipeline, barge, tanker, truck, or rail; monitoring at the station pump; and mobile laboratories to monitor lead throughout the entire marketing operation. A gasoline can be produced and distributed which meets, on the average, the proposed 0.05 g/gal level set by the EPA. However, these levels cannot be achieved with complete consistency with the present distribution system as long as the industry is distributing both leaded and unleaded gasoline.

21958

APTIC NO. 40982

Eisler, Dieter

COMBUSTION SYSTEMS FOR INDUSTRIAL FURNACES. A SURVEY OF BURNER CONSTRUCTIONS AND FIELD OF APPLICATION. (Die Industrieofenfeuerung. Ueberblick ueber Brennerkonstruktionen und Einsatzgebiete). Text in German. Tech. Mitt., 65(3):116-121, March 1972.

Automatic, semi-automatic, and manually operated burners exist for gas or fuel oil. The construction of the burner depends on special requirements. For achieving higher flame temperatures, primary air must be preheated to 450 C. Recuperators are used for preheating which take advantage of the high temperature of the waste gas. Burners and furnace

systems are discussed where the flue gases come in direct contact with the material. In many cases, a certain atmosphere is required in the combustion chamber. If the flue gases are passed into the combustion chamber, an atmosphere develops which is dependent on the type of fuel and on the fuel to air ratio. This is demonstrated by the example of waste gas analysis in the combustion of fuel oil. The essential components in this case were water vapor and carbon dioxide as well as O_2 dependent on the fuel to air ratio.

21959

Eisenbud, Merrill and Laurel R. Ehrlich

CARBON MONOXIDE CONCENTRATION TRENDS IN URBAN ATMOSPHERES. *Science* 176(4031):193-194, April 14, 1972. 17 refs.

The predominant modern source of carbon monoxide is exhaust gases from the internal combustion engine, which contribute 97% of the CO in New York City. Earlier sources were incomplete combustion of fuels for space heating, water heating, cooking, and electricity production. Pollution from these sources has diminished with the advent of cleaner burning fuels so that CO concentration may actually have decreased since 1922. Indoor exposure to CO has decreased greatly in recent years as indicated by the decrease in the number of deaths due to accidental exposure in New York City from 379 in 1945 to an average of three per year in the past 5 years.

21960

Ensink, P.

INDUSTRIAL POWER PLANT SWITCHES TO NATURAL GAS. (Umstellung eines Industriekraftwerkes auf Erdgas). Text in German. Mitt. Ver. Grosskesselbetr., 52(3):212-217, June 1972. 3 refs. (Presented at the VGB-Fachtagung Gasfeuerungen 1971, Bremen, Nov. 26, 1971, Stuttgart, Dec. 3, 1971, and Bonn Dec. 17, 1971.)

A power plant in Kassel successfully switched to operation with fuel oil and now to natural gas after it had operated for 30 years with soft coal. The power plant possesses a total of eight boilers, six of which are old models. The decision to switch the entire power plant to natural gas operation was made after a request by the authorities to build a 245-meter stack and a new dust cleaning system. With the switch from soft coal to fuel oil the sulfur dioxide emission was reduced from 700 kg/hr to 160 kg/hr at about the same steam production. The dust emission was reduced from 450 kg/hr to zero. The further switch to natural gas reduced the SO_2 emissions also to zero. The old boilers can easily be operated with 110% of the former nominal capacity. A degree of efficiency of more than 90% is achieved now on the average over the month versus 75% with soft coal operation.

21961

Euler, Karl Joachim

ENERGY DIRECT CONVERSION TODAY. (Energie-Direktumwandlung heute). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorfer), 114(8): 550-553, June 1972. 11 refs.

The major part of electric power is produced in steam power plants. They discharged waste heat into the atmosphere in addition to a certain amount of pollutants. Although much has been done, not all air pollution can be avoided. Moreover, the considerable carbon dioxide development in the vicinity of such plants must not go unheeded. If it were possible to reduce the fuel consumption all of these negative aspects could be diminished. The magnetohydrodynamic (MHD) generators are possibly one important step to this end. The principle of the MHD generator is based on the passage of a conductive liquid or gaseous medium through a transverse magnetic field at considerable speed. Depending on the type of fluid three groups of MHD generators are distinguished, those with flame gases, with noble gas plasma, and with liquid metals.

AIR POLLUTION ABSTRACTS, SEPTEMBER 1972

The MHD generators with flame gases have the greatest importance. Potassium compounds are added to the flame gases for increasing the electric conductance. Despite this, a temperature of 2000 to 3000 C is required for achievement of the required conductance. The magnetic field must have a magnetic induction of about 30,000 G at field dimensions of one cu m. Two such experimental generators exist in the Soviet Union and two projects are in the developmental stage in Germany.

21962

Ewing, Robert C.

BIG USERS OF ENERGY LOOK FOR SAVINGS. *Oil Gas J.*, 70(9):74-80, Feb. 28, 1972. 3 refs.

Fuel costs rank second among costs of an oil refinery, and they are rising. While some systems operate with lower fuel costs, higher investment costs offset the saving. The condensing steam turbine produces power at low fuel cost where only shaft power is required or where process heat is provided from other sources. Costs are cut by 1/2 when the noncondensing steam turbine's exhaust can be utilized for process heat or steam supply to other turbine drives. Savings in process steam use can be compensated by installation of automatic extraction, automatic admission, or automatic extraction-admission-condensing turbines. The major factor in turbine performance is the theoretical energy available as steam expands from turbine inlet conditions to the extraction or exhaust pressures. Maximum recovery of heat from the process into the energy cycle is important. There may be opportunities for recovering power directly. Hydraulic turbines should not be installed where payout is marginal. Electrical power generated at one Gulf Coast refinery costs 45% of purchased power. One Gulf Coast refinery monitors steam, electricity, and gas, air, and water supplies by computer. Steam is produced by gas-fired boilers, by waste heat recovery train process boilers, and from process heat exchangers. Electricity is purchased. Purchased gas is used as fuel in boilers, gas engines, and as a feedstock. Water flow and pressure are maintained by computer.

21963

Feldman, Lewis

FAN ARRANGEMENT FOR POLLUTION CONTROL. (Assignee not given.) U. S. Pat. 3,643,581. 9p., Feb. 22, 1972. 7 refs. (Appl. Jan. 6, 1969, 14 claims).

A rotary fan arrangement is presented which is to be mounted on a structure such as a smokestack to create a plume of ambient air concentric with the pollutants rising upward from the stack. The plume of air serves both to dilute the pollutants and to carry the pollutants aloft. The fan arrangement may comprise hinged blades or centrifugally erected sail rotors. (Author abstract modified)

21964

Fish, R. A.

POLLUTION. *J. Oil Colour Chemists Assoc. (London)*, vol. 55:493-506, 1972.

Under the aegis of the Clean Air Acts of 1956 and 1968, the emission of smoke in London has been reduced from an average of 309 micrograms/ μ m in the winter of 1958-9 to 66 micrograms/ μ m in 1969-70. The sulfur dioxide content of the air was ignored by the Clean Air Acts and has probably increased. The steady decrease to 192 micrograms/ μ m for 1969-70, two-thirds of that for 1958-65, is thought to result from the high stack policy of the Central Electricity Generating Board. It is thought that further substantial reductions would result if the use of low-sulfur fuels became mandatory. Street level measurements of carbon monoxide rarely exceed 50 ppm, and the total contribution of the automobile to air pollution is small. Studies are in progress to determine the relationship between the automobile and carbon oxides, hydrocar-

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bons, nitrogen, and lead. It is suggested that a pilot monitoring system be established for all pollutants, especially the nitrogen oxides. The history of river pollution, refuse disposal, radioactive waste disposal, and noise pollution are all discussed.

21965 APTIC NO. 41681

Foard, James E. and Russell R. Beck

COPPER SMELTING. CURRENT PRACTICES AND FUTURE DEVELOPMENTS. Preprint, American Inst. of Mining, Metallurgical and Petroleum Engineers, (AIME), New York, N. Y., 51p., 1971. 42 refs. (Presented at the American Institute of Mining, Metallurgical and Petroleum Engineers, Annual Meeting, New York, Feb.-March 1971.)

The current structure of the copper smelting industry is reported in terms of the number, distribution, type, and value of smelters in the United States and abroad. The balance between U. S. smelting capacity and domestic concentrate production is examined. The cost of smelting and the pollution abatement factors which affect it are analyzed. Currently practiced smelting methods include reverberatory furnace, flash furnace, electric furnace, blast furnace, and shaft furnace smelting, converting operations, gaseous deoxidation of molten copper, and slag flotation. Areas of process and equipment development in which there has been much activity but which have not yet reached the state of complete commercial feasibility include: continuous smelting, oxygen top blowing, cyclone smelting, separate melting of precipitates, charge preparation, and recovery of metal values from slag. A copper smelter designed to meet the future requirements of effective pollution abatement, continuous smelting, conservation of fuel and power, simplification, improved working conditions, and economic feasibility is described. 0

21966 APTIC NO. 41108

Foerster, H. J.

VEHICLE ENGINE OF THE FUTURE - REVOLUTION OR EVOLUTION. (Der Fahrzeugantrieb der Zukunft - Revolution oder Evolution). Text in German. *Erdoel Erdgas Z.*, 87(9):282-302, Sept. 1971. 22 refs. (Presented at the Oesterr. Gesellschaft fuer Erdoelwissenschaften Annual Meeting, Vienna, Austria, April 23, 1971.)

Anticipated future developments are reviewed with regard to vehicle engines of established as well as experimental types, based on the officially imposed present and future maximum permissible contents of carbon monoxide, unburned hydrocarbons, and nitric oxide in automobile exhaust gases. In the U.S.A., by 1975/76, only about 3% of the average concentration values that occurred in 1967 will be permitted. Accordingly, several changes will be required in connection with the gasoline engine, such as a modified distributor, a special carburetor, or an electronically controlled gasoline injection system, crank case ventilation, controlled recirculation of exhaust gases, exhaust catalysis, or thermal reactors attached to the engine outlet. Alternative solutions could be the Wankel engine with rotary pistons, the gas turbine, the Stirling engine, and the steam engine. Battery powered electric motor drives are completely emission-free, basically ideal for city transportation. With some experimental models, one battery charge lasts for up to 80 km travel. A very suitable compromise for extended city and suburban travel appears to be the hybrid drive for buses. It includes a Diesel engine driving an electric generator, a main drive motor, and lead batteries. The latter are being charged by the generator, and can also be recharged by outside network current when the bus is not in use, i.e., during periods between rounds.

21967 APTIC NO. 42191

Fraser, Ross F.

WHAT SULPHUR DIOXIDE PROBLEM. Combustion, 43(2):7-11, Aug. 1971.

Sulfur dioxide, in low concentrations, is a natural and essential component of the atmosphere like carbon dioxide. The reason why sulfur has not been recognized as an essential and major plant nutrient is bound up with the history of fertilizers. Crop yields have fallen in recent years despite even higher applications of nitrogen fertilizers; one suspects that the farmers have been using the new high analysis fertilizers and not supplying sufficient sulfate to go with the nitrate and phosphate. Figures for SO₂ emission in the U. S. are given, as well as fuel sulfur restrictions. High concentrations of SO₂ are a result of emission with poor dispersion. Local effects of tall stacks are considered, including limitations to chimneys and a rational SO₂ policy. There are no established data on any visible plant damage below 400 micrograms/cu m. Concentrations around 500 micrograms/cu m seem to have no effect even on sufferers from bronchitis.

21968 APTIC NO. 41161

Fujii, Toru

A STUDY ON THE INFLUENCE OF EMISSION GAS FROM POLYVINYL CHLORIDE MANUFACTURING PLANT ON HUMAN BODY. REPORT NO. 2. (*Enka biniru seizo kojo haigasu no jintai e no eikyo ni kansuru kenkyu (2)*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):62, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The gas emitted in the foaming process of polyvinyl chloride sheets has become a serious cause of air pollution and usually irritates mucous membranes such as throat, nose, larynx, and eye. Using five kinds of PVC sheets, the elements of the gas created by thermoanalysis and the cause of irritation was studied. Test Material 10 mg was heated in the air and the gas was gathered and led to a gas sampler which was maintained at 200 C; two minutes later, the gas was applied to gas chromatography. Under the same thermoanalytical conditions, carbon monoxide, carbon dioxide, and hydrogen chloride were formed. When the gas was introduced to a N-pentane environment, benzene was formed. From the above result, it was conjectured that the cause of irritation of mucous membranes was probably phthalic acid anhydride.

21969 APTIC NO. 41508

Gadomski, R. R. and Mary P. David

A SURVEY OF INK AND SOLVENT USAGE IN THE GRAPHIC ARTS INDUSTRY. *Proc. Tech. Ass. Graphic Arts*, 1971:397-419, 21 refs.

A study was conducted to determine the nature of emission problems in the graphic arts and metal decorating industries. Included in the study was acquisition of an initial perspective of the industry's involvement and its problems, partially defined by a survey of solvent and ink use during 1968, probably the first industry-wide survey ever conducted. The source of effluent to the atmosphere from printing and metal decorating plants is primarily organic solvents contained in a wide variety of inks and varnishes used to manufacture the printed product. The survey characterized which phases of printing activity were involved in air pollution as defined by existing legislation, which areas were susceptible to new legislation, and which areas were free from concern. Response was representative of the industry geographically and by process. Ink usage of respondents who print by letterpress (exclusive of newspapers), lithography (including metal decorating), gravure and flexography reported having used 32% of the estimated industry totals for these processes, and distribution by process correlated well with market share as determined by the ink industry using both government census and industry figures. Approximately 80% of all inks reported were used in operations where the product was dried above room temperature. A total of 6.5 million gallons of coatings and varnishes and 21 million gallons of organic solvents also were reported used. Over half of the solvent was used as ink diluent, 83% of

which involved drying above room temperature. Only ten percent of the plants included any equipment installed to protect the quality of the atmosphere. (Author abstract)

21970

APTIC NO. 42080

Hayashi, Hiroshi

AIR POLLUTION DUE TO AUTOMOBILE EMISSION.
(Jidosha kogyo). Text in Japanese. Kagaku Kogyo (Tokyo). 21.7.9-1956, July 1972.

The public nuisance due to automobile emissions is mainly air pollution, noise, and interference of electric waves. The waste gas from automobiles contains carbon monoxide, hydrocarbons, nitrogen oxides, dust, oil mist, lead, black smoke, and hydrocarbons such as aldehydes and ketones. According to the Department of Public Welfare of the Japanese Government, the breakdown of pollution is as follows: 99.2% sulfur dioxide by industry, 92.8% dust by industry, 99.3% CO by gasoline, 90.5% HC by gasoline, 73.1% nitrogen oxides by industry, and 18.1% nitrogen oxides by gasoline. Hydrocarbons and CO are mainly emitted by automobiles. Both HC and NOx cause photochemical reactions and develop toxic ozone, oxidant, and smog. Diesel engines emit less nitric oxide than gasoline engines. However the mixed gas for gasoline engines is homogeneous and the mixed gas for Diesel engines is heterogeneous. Control methods are mentioned.

21971

APTIC NO. 41576

Hodgetts, Richard M. and Fred Luthans

THE ECOLOGICAL CHALLENGE FACING UTILITIES

Public Util. Fortn.: 89(9) 23-27, April 27, 1972. 2 refs.

Public attention has become increasingly focused on the role that utilities play in protecting the environment. Fifty large utilities were asked to respond to a short, confidential questionnaire divided into three parts: uncovering the major environmental problems facing utilities and planned programs to solve them; gathering financial data on expenditures for these programs; and examining the philosophies that utilities have toward environmental protection. In general, there is agreement among utilities on what the problems are. Most of the utilities have devised environmental programs which cost large sums of money to implement and have similar philosophies about their roles in environmental protection. Present and future programs to control air pollution included ambient air studies, the use of low-sulfur oil, the installation of pile-sulfur dioxide and particulate removal systems, the control of hydrogen sulfide, and the installation of electrostatic precipitators and high stacks. One of the most important conclusions that can be drawn from the study is that the government appears to be in doubt regarding the kind of legislation that is needed. Part of this problem appears to be the result of public pressure from conservationist groups, whose claims of environmental damage are questioned by the utilities, especially evident in the area of thermal pollution. Part of the doubt also arises from the government's desire to do something from a political standpoint but is still unsure of what this should be. Finally, part of the problem must be assigned to the utilities themselves for not being more vigorous in acquainting the general public with their own problems, programs and philosophy. (Author summary, modified)

21972

APTIC NO. 41946

Hoffman, Alan J.

NEW ORLEANS METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0823, 52p., Oct. 1969. 6 refs.

NTIS: PB 207693

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions of these pollutants are

AIR POLLUTION ABSTRACTS, SEPTEMBER 1972

delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were fuel combustion in stationary sources, transportation, solid waste disposal, industrial process losses, and evaporative losses. Sources that emitted large quantities of air pollutants were considered individually and located specifically within the area. An estimated 777,000 tons of the five major pollutants were emitted annually in the area in 1968, 67,630 tons of sulfur oxides, 66,880 tons of particulates, 427,800 tons of carbon monoxide, 120,150 tons of hydrocarbons, and 71,140 tons of nitrogen oxides. Industrial processes account for 83.4% and 70.7% of sulfur oxides and particulates, respectively. Road vehicles contributed 84.9% of the carbon monoxide emissions. Road vehicles and industrial processes together emitted 68.8% of the hydrocarbons. Nitrogen oxides were traced to transportation (50%), industrial fuel combustion (22.9%), and utility power plants (15.8%).

21973

APTIC NO. 41360

Hoffman, Alan J.

OMAHA METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. National Air Pollution Control Administration, Durham, N. C., Air Quality and Emission Data Div., Office of Air Programs Pub-APTD-0826, 63p., Feb. 1970. 7 refs.

NTIS: PB 207695

Estimates are provided of total emissions of oxides of sulfur, oxides of nitrogen, hydrocarbons, carbon monoxide, and particulate matter. The emissions are delineated with respect to source type, season of the year, and geographical distribution. Source categories considered were stationary fuel combustion, transportation, solid waste disposal, industrial processes, and evaporative losses. Facilities that emitted large quantities of air pollutants were considered individually. The predominant sources of the 57,300 tons of sulfur oxides emitted in 1968 were the combustion of fuels (64%) and industrial process losses (32%). Industrial processes and transportation were the largest sources of the 31,040 tons of particulate matter. Motor vehicles contributed 89% of 298,000 tons of carbon monoxide. The two largest sources of the yearly 54,000 tons of hydrocarbons were motor vehicles and evaporative losses, contributing 41% and 39% respectively. Motor vehicles and stationary fuel combustion were the major sources of the 39,300 tons of oxides of nitrogen.

21974

APTIC NO. 41946

Holzer, Alfred

PLOWSHARE AND THE ENVIRONMENT. Nuclear Technol., vol. 11:315-322, July 1971. 25 refs.

Deeply buried underground nuclear explosions used in the recovery of minerals and natural gas can have a positive impact on the environment. Emissions from a hypothetical 1,000 MW electrical plant using coal, oil, and nuclear stimulated gas are evaluated in terms of their downwind effect. A field development consisting of 15 wells the first year, decreasing to two wells/yr after five years would supply the plant gas energy requirement of 90 billion cu ft/yr. Four 100 kt explosives would be needed to stimulate each well. Tritium and krypton(85) concentrations are computed to decrease from 10 and 52 pCi/cm³ at 0.1 km to 0.5 pCi/cm³, respectively, during the first five years if the stimulating gas replaces chimney gas and the number of new wells decreases. The maximum effluent concentration occurs 1.3 km downwind from the plant where the ground level concentrations for sulfur dioxide for coal, oil, and nuclear stimulated gas would be 0.18, 0.004, and 0.00002 ppm, respectively. Converting the radionuclide concentration at the same location to dose shows that whole body tritium decreases from 0.14 mrem/yr for the first year to 0.018 mrem/yr after the sixth yr. The whole body Ir(85) dose decreases from 0.009 to 0.001 over the same period. These doses have been compared with those from natural and man-made radioactive sources and show that nuclear stimulated

natural gas yields a maximum annual dose comparable to that from television sets or luminous watch dials.

21975

APTIC NO. 41166

Inoue, Rikita, H. Tanizawa, A. Watanabe, B. Nakashima, D. Kita, K. Tanaka, K. Masuda, and A. Nakamura

THE MECHANISM OF URBAN AIR POLLUTION.

(*Toshi taiki osen no kiko ni tsuite*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):1, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Unlike other cities of Japan, the main source of air pollution in Sapporo is the heating systems of various buildings and homes during the winter. Characteristically, the pattern of air pollution is an even distribution of numerous relatively small-scale sources throughout the city in contrast to the pattern of air pollution in industrial cities. In order to grasp the actual condition, air quality measurements were taken from 42.5 sq km of congested residential and building areas of Sapporo in 1967 and 1968. The total sulfur dioxide emission for all of Sapporo was 3490 tons, but it was discovered that a small area of 2 sq m in the center of the city produced 29% of the total emission, that 75% of the total SO₂ emission (2620 tons) was produced from furnaces with more than 0.25 sq m of furnace floor (fire grate), and that approximately 70% of the total soot was conjectured to be emitted from the same source. The air pollution concentration was influenced much more by the total emission quantity than by meteorologic factors such as wind direction, velocity, and atmospheric stability. The momentary count, daily average, and monthly average in particular were very closely related to the total emission quantity. The daily emission quantity and the daily average temperature were closely related. The correlation index between the daily fuel consumption of a building and the average temperature is approximately 0.9 with some fluctuation.

21976

APTIC NO. 41951

Inoue, Takeyasu

ACCIDENT IN CHEMICAL INDUSTRIES DUE TO THE DEFECT OF MATERIAL STRUCTURE. (*Zairyo kozo kekkan ni yoru kagaku kogyo no saigai*). Text in Japanese. *Kagaku Kogaku (Chem. Eng.)*, 35(10):1057-1064, 1971. 18 refs.

The material defects of equipment caused not only fire and explosions, but also air and water pollution. Machines that had accidents ranged from a large compressor to a small pipe, and possible substances that were discharged included poisonous chemicals, harmful gas vapors, particulates, and mist. Investigations on important accidents of a chemical company revealed that 21.4% were caused by material defects of the equipment, and 35.7% were due to mismanagement. A fool proof design is necessary so that no accident will occur even if there are operational mistakes.

21977

APTIC NO. 41965

Keeney, D. R. and L. M. Walsh

SOLVING POLLUTION PROBLEMS. AVAILABLE NITROGEN IN RURAL ECOSYSTEMS: SOURCES AND FATE. *HortScience*, 7(3):219-223, June 1972. 37 refs.

The nitrogen cycle is examined in light of the fact that world agricultural output must be doubled to feed the present world population thus putting strain on the world ecosystem. Nitrate and other nitrogen compounds in surface and groundwater are mentioned. Potential sources of nitrogen trioxide and other N compounds include precipitation, decomposition of organic matter, legumes, and N fertilizer. Ingestion of nitrogen oxides by humans can cause methemoglobinemia, and excesses in surface waters hasten the eutrophication of lakes. Considerable control may be exercised over the rate of pollution of ground water. The methods include: limiting the rate of water

and N to the needs of the crop; controlled use in soils subject to rapid leaching; use of crops that require little or no N fertilizer; growing deep rooted crops; growing cover crops between growing seasons; and preventing the leaching of manure. The most critical research needs are for botanical studies of the need for N in order to determine a supply in proportion to uptake rate. Water treatment methods are needed as well as a mathematical method for prediction of the N cycle.

21978

APTIC NO. 41518

Kellogg, Herbert H.

ENGINEERS AND THE ENVIRONMENT. *J. Metals*, 24(6):13-17, June 1972. 13 refs.

The drop in engineering enrollment in colleges is just one symptom of ecological consciousness and public disenchantment with technology and its products. The need for new priorities and the concept of social thrift is exemplified in our handling and use of lead and aluminum and the projections of their future use and supply. At the present rate of consumption, known world reserves of lead will be exhausted in 26 years. Even with a five-fold increase in reserves, the 2% annual growth rate in lead consumption will result in exhaustion within 64 years. Lead must be eliminated as a gasoline additive, and all storage batteries must be recycled. Bauxite reserves for aluminum production are expected to last only 31 years at the present expansion rate of 6.4%/yr. The cost of producing aluminum from clays and shales will be considerably greater than at present. A pound of aluminum uses 11 times more coal than a pound of steel, producing in the process high air pollution potential. As of 1968, 2% of the domestic aluminum supply was generated from the recycling of scrap. The U. S. Bureau of Mines projects that the use of aluminum for can and packaging will increase from 460,000 t in 1968 to 2,300,000 t by 2000.

21979

APTIC NO. 41168

Kikuchi, K., S. Sata, H. Funaki, H. Sone, and K. Saito

BAD ODOR EMISSION SOURCES IN KP PLANTS. (*KP kojochu no akushu hasseigen ni tsuite*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):149, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Exhaust gas was sampled at several process emission sources in a kraft pulp mill. The gas was captured and condensed by acetone of -78 deg. and its volatile organic compounds were measured by gas chromatography. Methyl mercaptan and dimethyl sulfide were detected in the flue gas of the recovery boiler, and in the blow tank exhaust and turpentine tank exhaust in the distillation process. The organic sulfide concentration of the recovery boiler was only several ppm, but the blow tank concentration of dimethyl sulfide was close to 300 ppm and gas from the turpentine tank had considerably greater concentrations of CH₃SH and CH₃SCH₃, on the order of 14,000 ppm. These seemed to be the main source of bad odor. Since the odor thresholds of these substances are very low, the emission gases from the blow tank and turpentine tank can be considered major sources of public nuisance.

21980

APTIC NO. 40966

Koch, Karl H.

X-RAY FLUORESCENCE ANALYSIS OF THE SULFUR IN SOLID AND LIQUID FUELS. (*Röntgenfluoreszenzspektrometrische Bestimmung des Schwefels in festen und flüssigen Brennstoffen*). Text in German. *Arch. Eisenhuettenw.*, 42(12):883-885, Dec. 1971. 5 refs. (Presented at the Sitzung der Arbeitsgruppe Brennstoffe, Duesseldorf, West Germany, April 28, 1971.)

Samples of fuel oil were poured into an adaptor and either cooled to -10 C and the sulfur content determined in vacuo, or the sulfur content determined without cooling in a helium atmosphere. At 1.1% mean S content, the standard deviation

was 0.01% S. Ten samples take 20 min to analyze. Coke and coal samples were compared by compacting the powder at 3000 atm to form tablets. An analysis in a vacuum or in a helium atmosphere gave standard deviations of 0.014% S for 0.83% mean sulfur content. The form in which the S is present affects the x-ray fluorescence results, and it is therefore necessary that samples used for calibration to be of similar structure or type, or to use a correction function. Disulfide has the most marked effect.

21981

APTIC NO. 41567

Kolar, J.

THE ROLE OF NATURAL GAS IN THE CLEAN AIR MAINTENANCE OF URBAN AREAS. (*Die Bedeutung des Erdgases fuer die Reinhaltung der Luft in Staedten*). Text in German. *Wuerme*, 78(1-2):11-21, April 1972. 94 refs.

The role of natural gas in clean air maintenance of urban areas is outlined with special regard to domestic heating and other small energy consumers. Natural gas consumption in West Germany increased by 41% from 1969 to 1970. Emissions from firings consuming natural gas and other fuels are compared across an emission index which, though making no allowances for synergism and hydrocarbons, permits the objective evaluation of all harmful emissions. The elementary sulfur and sulfur compounds (hydrogen sulfide, carbon oxysulfide, mercaptans, and other organic compounds), present in natural gas, can be satisfactorily removed, while the residues form sulfur dioxide and sulfur trioxide during combustion. The nitrogen oxide emissions are dependent on the flame temperature, which makes the use of natural gas for domestic heating especially attractive. Carbon monoxide, unburned hydrocarbons, organic acids, and 3,4-benzopyrene may be formed under improper combustion conditions. The specific SO₂ emission is 0.004 kg/billion Joules, as against 0.12-4.38 kg/billion Joules for coal. The total emission is 5-15% of that from high-grade solid fuels. In addition, the emissions contain no CO, benzene, and hydrocyanic acid, while the 3,4-benzopyrene emissions are about one fifth of the corresponding value for fuel oils. The combustion gases contain no soot, and are nearly odorless. The respective hydrogen sulfide and organic sulfur contents in natural gases will expectedly be reduced to 5 mg/cu m and 150 mg/cu m. The total SO₂ emission will decrease by 65-100 million tons/year by 1980 as a result of the intense use of natural gas. Gas, leaking through high-pressure underground pipes, may damage trees. While natural gas, causing minimum primary and no secondary emissions, meets almost all requirements of environmental protection, it cannot replace fully other sources of energy due to its limited availability.

21982

APTIC NO. 41614

Kozak, Matyas and Erno Meszaros

CHEMICAL COMPOSITION OF RAINWATER IN HUNGARY AND ITS AGRICULTURAL IMPORTANCE. (*Magyarorszagi csapadékvizek kémiai összetételének mezőgazdasági jelentősége*). Text in Hungarian. *Agrokém. Talajtan*, 20(3):329-352, June 1971. 65 refs.

Electrical conductivity, pH, and concentrations of the nitrate, nitrite, sulfate, chloride, and ammonium ions, and of calcium, sodium, and potassium in rainwater were determined. The maximum ion concentration was in winter periods and it increased from west to east and from north to south. The total amount of anions was lower than that of cations, probably because the bicarbonate and carbonate ion contents were not determined. The amount of ions entering the soil and that reaching the vegetation was calculated. The anthropogenic factors had an indirect effect on the chemical composition of rainwater even in regions relatively far from industrial and urban centers. Of environmental factors influencing the ion concentration in rainwater, the soil surface had the highest effect. On the average, 14.6 kg N per ha, 9.1 kg ammonium N, 5.3 kg nitrate, 0.2 kg nitrite-N, 23.6 kg S, 9.0 kg chloride ion, 28

kg Ca, 9.4 kg Na, and 6.7 kg K per ha were brought down annually with the rain. Phosphate content of rainwater did not exceed 0.1-0.2 kg/ha/yr.

21983

APTIC NO. 41152

Kraeft, D.

OBSERVATIONS ON AUTOMOBILE EMISSION TESTING PROCEDURES. (*Anmerkungen zu Prüfverfahren fuer Autoabgase und Folgesaussichten zur Reinhaltung der Luft*). Text in German. *Dechema Monograph.*, vol. 64, 15p., 1970. 12 refs.

The median carbon monoxide emission per automobile in Greater Los Angeles in 1970 was estimated to be 3.0 g/mi according to the California test. To bring CO pollution down to its 1940 level this emission volume would have to be reduced to 1.5 vol %, a reduction of 60%. Similarly, hydrocarbons measured as n-hexane would have to be reduced by 80%. But the choice of n-hexane as an indicator of hydrocarbon emission was later found to be misleading because the infrared absorption gas analyzer sensitive to n-hexane registers olefins and aromatic hydrocarbons only partially. A newer, more sensitive analytic procedure for hydrocarbons using flame ionization detection is an improvement but still does not measure the entire hydrocarbon spectrum. Hydrocarbons in exhaust gases are composed of 42.6% paraffins, 45% olefins, and 12.4% aromatic compounds. To arrive at an equivalent smog potential of these individual fractions, gas chromatographic values of paraffins must be multiplied by a factor 0.6, olefins by 2.2, and aromatic compounds by 0.7. In a 1972 test procedure, an exhaust gas sample diluted with air to prevent secondary reactions between hydrocarbons and nitrogen oxides intrapped in a plastic bag is analyzed with a flame ionization detector calibrated for propane within a range of 0-100 ppm. Carbon monoxide is measured by the infrared absorption gas analyzer. Dilution with air interferes with a reliable determination of nitrogen oxides.

21984

APTIC NO. 42168

Kroms, A.

THE FUELS USED BY AMERICAN POWER PLANTS. (*Die Brennstoffbilanz der amerikanischen Kraftwerkswirtschaft*). Text in German. *Energie*, 24(5):121-128, May 1972. 28 refs.

Between 1970 and the year 2000 the demand for electric power will rise in the U. S. by 400 to 500%. By 2000 nuclear power plants will cover 40 to 60% of the demand. The remainder will be produced with fossil fuels. Coal is the one fossil fuel which is available in the U. S. in largest quantities. Its use poses difficulties through its ash and sulfur contents. Since the desulfurization of flue gases is not satisfactorily solved yet, low-sulfur coals are preferred for use as fuel in power plants. Most of the coal from east of the Mississippi has a sulfur content of more than one per cent. A radical solution could possibly be provided by coal gasification, but it is not yet known if this is feasible. The use of oil and natural gas has risen from 10 to 35% over the period 1940 to 1970. Enough supplies of these fuels are available in the U. S.

21985

APTIC NO. 41209

Kutenev, V. F., V. N. Toponov, and A. A. Charvkov

CRANKCASE GASES AND THE INJECTION OF TOXIC SUBSTANCES WITH ETHICAL EXHAUST GASES.

Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, *Snizheniye Zagryaz. Vozdukh. Gorodakh. Vykhlupn. mi. Gazami. Avtomob.*, Proc. Symp., 2nd, 1971. 5 refs. (Translated from Russian, 10p.)

The closed crankcase ventilation system with return of gases ahead of the carburetor reduces the emission of unburned hydrocarbons to the atmosphere by 10 to 30%, nitrogen oxides by 5 to 25%, and increases the emission of carbon monoxide from 10 to 35%. The closed crankcase ventilation system with

return of gases after the carburetor reduces the emission of hydrocarbons to the atmosphere by 10 to 40%, CO from 10 to 25%, and increases the emission of NO_x from 10 to 40%. The effectiveness of the use of a closed crankcase ventilation system depends on carburetor adjustment. Such systems increase the concentration of the carcinogen benzopyrene in the exhaust gases. Ventilation systems that simultaneously return crankcase gases ahead of, and after, the carburetor, must be used to reduce the effect the crankcase ventilation system has on the emission of toxic substances with exhaust gases. The ventilation system should be adjusted so that the air-fuel ratio over the entire operating range is approximately the same as it is for operation with the open crankcase ventilation system. Crankcase gases should be scrubbed to remove the oil components; this will lead to a reduction in the emission of benzopyrene with the exhaust gases.

21986

APTIC NO. 41732

Laamanen, Arvo

ECOLOGICAL STUDY OF ARSENIC POLLUTION IN THE ENVIRONMENT OF AN ORE PROCESSING PLANT. *Work Environ. Health (Helsinki)*, 9(1):40-43, 1972. 5 refs.

An ore-processing plant at Kokkola in western Finland produces arsenic in sulfur compounds. The arsenic in ore concentrate measured 0.034% by weight during 1962-1968, while arsenic in fly ash reaches 1 to 2% by weight. Calcium arsenate in liquid waste precipitates as arsenic sulfite and is collected in waste piles. Samples of snow, milk, and well water were taken 0 to 15 km from the plant. Control samples were taken 40 km from the source. Snow and milk surveys show similar distribution and imply pollution from respiration, drinking water, and cattle food. Arsenic ranged from 0.7 micrograms/l in drinking water and decreased irregularly away from the smelter. Arsenic in milk exceeded 0.003 mg/l. The maximal effect was observed at a distance of 8 to 12 km. The stack height at the smelter is 140 m.

21987

APTIC NO. 41956

Levin, Arthur A., Thomas J. Birch, Robert E. Hillman, and Gilbert E. Raines

THERMAL DISCHARGES: ECOLOGICAL EFFECTS. *Environ. Sci. Technol.*, 6(3):224-230, March 1972. 4 refs.

Estimated projections indicate that future electric demand will double every 10 years. Of utmost importance to the steam-electric power industry is available water for condenser cooling. Waste heat rejected to cooling water is a function of the efficiency of the plant type. The thermal efficiency of fossil fueled plants is greater than of nuclear fuel plants and though nuclear plants do not vent any heat to the atmosphere, they eject about 50% more waste heat to the cooling water than coal, or oil plants. The use of nuclear plants will rise to 50% of capacity by 2000. The result of several ecological studies around operating power plants is that with a few exceptions, there has not been any major damage to the aquatic environment from the heated effluents of existing power plants. In future years, as larger plants become operational, accompanied by multiple units at a single site, environmental management of heated effluents at these sites will become more difficult. At one extreme is employing methods which recycle cooling water and add no waste heat to the natural waters. This extreme is not required to ensure well-balanced aquatic communities. Unlimited thermal loading would be disastrous. The option remaining is to discharge heat in balance with the assimilative capacity of the water resources. Pursuing this course requires total commitment to determine the assimilative capacity and the advice of ecologists should be sought and base line ecological studies should begin as soon as a suitable site is selected.

21988

APTIC NO. 42037

Liebrucks, Manfred

DEVELOPMENT OF THE ENERGY EXPENDITURE IN THE GERMAN FEDERAL REPUBLIC AS ANTICIPATED THROUGH 2000. (*Die Entwicklung des Energiebedarfs in der Bundesrepublik Deutschland bis zum Jahre 2000*). Text in German. *Chem. Rundschau (Solothurn)*, 25(9):220-221, March 1972. (Presented at the *Energie, Mensch, Umwelt Symposium*, Rueschlikon, Zurich (Switzerland), Feb. 3-5, 1972.)

The procedure and results of calculations of the development of the energy expenditure in the German Federal Republic as anticipated through 2000 are presented. The estimations were based on a rate growth of 4.5%/yr, while the effects of possible environmental protection measures were not considered. The calculations were performed separately for 22 different industries, in determining gross and specific energy expenditures, for households and other small consumers as well as for transportation. The energy expenditure within the energy transforming sector is composed of various losses due to transformation, distribution, and intern power consumption. The energy expenditure, expressed in million tons of coal equivalent, will rise from 224 to 582 million tons by 2000, while the share of industry will decrease from 40% to about 33%. The energy expenditure of households and small consumers will be highest in absolute value with nearly 200 million tons, and the increase in transportation will be 56 million tons. The rates of increase in electricity consumption by industry and households will be 500% and 1000%, respectively, while the increase in the share of transportation is expected to be unimportant. The increase in the energy transforming sector will be some 400%, and 1450 billion kWh out of a total of 1940 billion kWh will be expectedly be produced by nuclear power plants. An efficiency of 0.290 kg of coal/kWh in conventional power plants is anticipated. Petroleum, natural gas, and nuclear energy will be the chief energy sources. In projecting the energy balance, the possible risk of the thermal unbalance of the atmosphere should be considered.

21989

APTIC NO. 41464

Linden, Henry R.

U. S. GAS DEMAND AND SUPPLY. *Bureau of Mines Information Circ.*, no. 8471:120-137, 1970. 28 refs. (Presented at the *Bureau of Mines-University of North Dakota Symposium*, Grand Forks, N. Dak., May 1-2, 1969.)

Data on natural gas demand and supply, energy consumption, and trends in fuel usage in the United States are examined. A high probability of inadequate gas supplies beginning in the middle 1970s is indicated. There is yet no evidence that forces capable of correcting the static supply situation are being mobilized. Recent experience has shown a consistent trend of growth in gas use that is higher than projected growth rates. The effects of the present effort on air pollution abatement favors natural gas over other fossil fuels which could lead to its extensive use in new applications such as stationary fuel cells and, in liquid form, as transport fuel. This use, however, may not yet be reflected in current forecasts. The alternatives of rapidly depleting available natural gas supplies to meet all market demands without concern for the future, or restricting the use of natural gas, are unacceptable. The only practical alternative, therefore, is to rapidly develop supplemental sources of pipeline-quality gas in the form of imports from Canada and as liquefied natural gas from overseas; along with synthetic gas production from coal. These sources appear to be both technically and economically feasible and capable of meeting any reasonable projections of gas shortages to the end of the century at a relatively small premium over conventional supply. (Author conclusions modified.)

21990

APTIC NO. 42186

Loeßner, Kurt

ON CARBON MONOXIDE EMISSION FROM MOTOR VEHICLES - CURRENT SITUATION AND DEVELOPMENTAL POSSIBILITIES. (*Ueber die Kohlenmonoxid-Emission von Kraftfahrzeugen - Stand und Entwicklungsmöglichkeiten*). Text in German. Staub, Reinhaltung Luft, 32(2):60-85, Feb. 1972.

Carbon monoxide emission by internal combustion engines is kept at its minimum at an air-fuel ratio of 1.05-1.15. At speeds between 50 and 115 km/hr, CO emission is low, below and above these speeds CO emission increases sharply. In West Germany new vehicles must conform to the European test which measures CO emission at a median speed of 18.6 km/hr. Carbon monoxide plus hydrocarbon emissions at that speed must not exceed 37g/km. Diesel engines under full load work with an air-fuel ratio of 1.25 under which conditions CO emission amounts only to 0.025-0.038%; the difficulty with Diesels is the difficulty of reducing nitrogen oxides emission because no catalytic afterburners can be used. The Wankel engine works with an air-fuel ratio of 0.9 and emits much hydrogen, CO, and HC, but little NOx. Carbon monoxide and HC emissions can be sharply reduced by secondary air combustion at 1000 C. Gas turbine engines for heavy trucks working at a compression of between 3.8-6.4 at gas temperatures between 920-1050 C emit, as a result of excess air, comparatively low quantities of CO and HC which cannot be further reduced. Nitrogen oxide emission is currently far above levels set for cars for 1976; attempts are under way to reduce this emission by precombustion of a rich fuel mix (air-fuel ratio 0.4-0.7) but smoke emission is a problem. The Stirling engine with external combustion works with excess air, its CO and HC emission is low, but its NOx emission high and the engine expensive. The steam engine working with excess air has low CO and HC emission, NOx emission is greatest at an air-fuel ratio of 1.15. By initial combustion of a poor fuel mix NOx emission can be kept low, the high CO and H₂ emission can be oxidized by secondary combustion.

21991

APTIC NO. 41532

Lukash, V. P.

CALCULATION OF EMISSIVITY OF HYDROCARBON FUEL COMBUSTION PRODUCTS (CO₂ AND H₂O) AT HIGH TEMPERATURES AND PRESSURES. *High Temp.* (English translation of Russian: *Teplofiz. Vys. Temp.*). 9(4):647-653, Feb. 1972. 16 refs.

For calculation of the emission of combustion products at high pressures and temperatures, physically substantiated values of the emissivities and absorptivities of carbon dioxide, water vapor, and mixtures of these gases are required. An analytical method of calculating the main quantities which determine the specific radiant heat flux from an isothermal mixture of fuel combustion products to its gray surroundings is presented. The method is based on the just-overlapping spectral line model. The limits of the validity of the method are also discussed.

21992

APTIC NO. 41609

Mayaudon, Enrique Marquez

ENVIRONMENTAL POLLUTION. (*Contaminación ambiental*). Text in Spanish. *Salud Publica Mexico*, 13(2):133-140, March-April 1971. 5 refs.

Pollution source and general air pollution conditions as affected by the increase in urban population along with measures taken to combat the threat from the continuous rise of pollution in Mexico are reviewed. While in 1900 the urban population constituted 18.8%, it amounts to 45% in 1970. The number of automotive vehicles increased from 1.5 million to 2.0 million from 1967 to 1970 and is associated with a daily consumption of 7700 cu m of gasoline and of 950 cu m of diesel fuel. These fuel consumption figures are estimated to emit 3.8 million kg of pollutants daily with carbon monoxide

prevailing. Other pollutants from automobiles include aldehydes, hydrocarbons, nitrogen oxides, organic acids, and particulates. Air transport, petroleum refining, power generating, and asphalt producing plants, along with refuse incineration and cement manufacturing constitute some of the other pollutant emission sources in Mexico. The department of environmental hygiene has organized a network of 10 continuous air pollution monitoring stations in the Mexico Valley and a central monitoring station located in the building of the department performing daily air sampling and analysis. A total of 17,637 air samples analyzed between Aug. 1967 and Dec. 1970 indicate a considerable increase in sulfur dioxide and other pollutants in 1970 as compared to the previous years. Epidemiology studies are being organized by the National Academy of Medicine to investigate the effects of air pollution on human health. To prevent and control environmental pollution, a federal law has been written by the Mexican government in March 1970. The law emphasizes the national importance of the pollution problem in the preservation and improvement of the ecology. The importance of cooperation between the government and citizens is pointed out along with the necessity of public awareness of the importance of this problem. Data is given for sulfur dioxide and trioxide, suspended particles, and settling particles in Mexico.

21993

APTIC NO. 41467

Miles, F. W.

URBAN NUCLEAR ENERGY CENTER STUDY: ESTIMATES OF PROCESS STEAM CONSUMPTION BY MANUFACTURING INDUSTRIES IN THE UNITED STATES. Oak Ridge National Lab., Tenn. Chemical Technology Div. and Oak Ridge National Lab., Tenn. Reactor Div., Dept of Housing and Urban Development Contract W-7405-eng-26. IAA-H-3-69, Rept. ORNL-HUD-2, UC-38. 19p., Jan. 1970. 15 refs.

NTIS: ORNL-HUD-2

The rate of consumption of process steam by manufacturing industries in the United States for the year 1980 was estimated as part of a program for evaluating the usefulness of urban nuclear energy centers. Perazich-type assumptions were made with respect to the use of steam by the food, paper, chemicals, petroleum, rubber, and textile industries. Steam consumption in 1962 was estimated by several methods for selected industries from fuel consumption data and the values were projected to 1980. The estimates of steam consumption for 1980 varied from 67.6 times 10 to the 14th power to 95.4 times 10 to the 14th power Btu depending on the methods and assumptions employed. This estimated consumption of steam by manufacturing industries is approximately equal to the 92 times 10 to the 14th power Btu of electrical energy estimated to be required in 1980. This indicated that a significant amount of thermal energy from an urban nuclear energy center would be consumed by manufacturing industries if the area served by the center had a fraction of the country's steam-using industries equal to its fraction of the country's population.

21994

APTIC NO. 41045

Morishita, Shozo

POLLUTION. (*Kogai ni suite*). Text in Japanese. *Sekko to Sekkai* (Gypsum Limer), no. 114:211-217, 1971.

A general discussion on pollution and public nuisance was given. About 95% of the gypsum used in Japan comes from the Middle East where the sulfur content of petroleum is as high as 3%. The sulfur dioxide and sulfur trioxide in air cause asthma, and is also harmful to skin. A concentration of nitrogen dioxide of higher than 5 ppm in air irritates the respiratory organs. Carbon monoxide is one of the major pollutants in air; 50% of the harmful gas in air is CO in the USA. The affinity of CO to hemoglobin is about 210 times of that of oxygen, and the formation of carboxyhemoglobin causes suffocation. In Los Angeles, approximately 1500 to 2000 tons of hydrocarbon are discharged every month from all sources.

Low concentrations of 3,4-benzopyrene cause lung cancer. About 0.01 to 0.02 ppm of ozone exist in air due to the photochemical reactions of nitrogen oxides and hydrocarbons. Particulates are also toxic. Twenty-eight pollutants are listed as harmful substances in air according to an air pollution control regulation. Water pollution, caused by mercury and cadmium, is a serious problem in Japan. Some major accidents after World War II and the controls were tabulated, including the symptoms of the patients.

21995

APTIC NO. 41145

Mueller, Peter K. and Miles Imada

ORIGINS OF SUBMICRON PARTICULATE MATTER IN THE ATMOSPHERE. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa. 28p., 1970. 33 refs. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Oct. 1970.)

A perspective of the current information about submicron particulate matter in the atmosphere was presented. The primary sources of these particles are attributed to anthropogenic origins and evolved directly from stationary as well as vehicular sources. Suspended particulate matter exists in a size range anywhere from condensation nuclei (0.002 micron) to giant particles (10-20 micron). Most of the aerosol mass is concentrated in the size range from 0.1 to 20 micron. Concentration and size distribution by number and chemical composition as a function of particle size were discussed. Lead, sulfate, and other metal content in particulates were also discussed. Particles vary in the atmosphere due to various meteorological conditions such as rain, fog, smog, and time of day. Data from the National Air Sampling Network for several cities is mentioned.

21996

APTIC NO. 42285

Muenzer M. and K. Hoder

RESULTS OF THE MEDICAL AND TECHNICAL INSPECTION OF CHEMICAL DRY CLEANING PLANTS.

(Ergebnisse der arbeitsmedizinischen und technischen Überprüfung chemischer Reinigungsbetriebe) Text in German. Zbl Arbeitsmedizin. 22(5):131-138, May 1972. 12 refs.

During the drying process in chemical dry cleaning plants air is blown into the atmosphere which may contain as much as 100 g perchloroethylene/cu m at the beginning of the air discharge. At the end of the process, after about 3 to 4 min, the concentration usually decreases to 20 g perchloroethylene/cu m. In North Rhine Westphalia all chemical dry cleaning plants which use per and trichloroethylene are required by law to clean the waste air to a residual concentration of 200/mg solvent/cu m. For compliance with this demand activated coal filters are used. The solvent is recovered for re-use. With the increasing importance of environmental protection it can be expected that the other federal states will follow the example of North Rhine Westphalia. The medical examination of personnel employed in a dry cleaning plant revealed in the majority of cases, symptoms of exposure to the dry cleaning solvents.

21997

APTIC NO. 41564

Nadeau, Jean-Paul

POLLUTION, PRODUCTIVITY, AND BENEFIT IN THE PULP AND PAPER INDUSTRY OF QUEBEC. (Pollution, productivite et rentabilite de l'industrie des pates et papiers du Quebec). Text in French. Papeterie, 94(5):376, 379, 380, 1972. 5 refs.

The impact of water and air pollution control on the productivity and benefit of the pulp and paper industry of Quebec is outlined. The rate of growth of the pulp and paper industry is below the average of the manufacturing industry as a whole, which, along with problems created by pollution control measures, calls for both expansion and structural changes in the paper industry. The capital costs of waste water treatment in

the total pulp and paper industry of Canada are estimated to be \$350 million, while the corresponding expenditure for air pollution control at a sulfate (kraft) paper plant with 500 t/day capacity lies at \$2 million. The additional production costs due to air and water pollution control lie at 3% (\$3 per ton) and about 4%, respectively. The additional costs as expressed in the percentage of the average sale price are estimated to be 3.5% for sulfate and mechanic pulp and 10% for bisulfite pulp. A 3% rise in the sale is expected to result in a decline of 3.5% in the total volume of sales. Adequate adjustments to pollution control in the pulp and paper industry are an urgent need. The pollution caused by old pulp and paper manufacturing plants is required to be reduced by 70%.

21998

APTIC NO. 41095

Ohara, Shigeyoshi

CONSIDERATION OF CRUDE OIL IN FUTURE. PETROLEUM RESOURCES. SULFUR CONTENT. LOCATION OF REFINERY IN JAPAN. (Kongo no sekiyu mondai ni tsuite. Sekiyu shigen. S bun kanyuutsu. Seiyusho ricchi nado). Text in Japanese. Nihon Gokyo Ricchi Sentu Kenkyu Nenpo. (Ann. Japan Ind. Location Center), no. 6:53-77, Dec. 1971.

Based on projected calculations, about 70% of the energy required in Japan in 1985 would be supplied by petroleum. Of the crude oil imported for refinement, 90% is from the middle east where the crude oil has the highest sulfur value. Utmost efforts were exerted in order to obtain low-sulfur crude oil. The crude oils supplied from 37 companies in Japan in 1970 had an average sulfur content of 1.59%. It is estimated that the sulfur content of crude oil will decrease to 0.45% and that of heavy oil to 0.90% (0.60% in control areas) by 1985. However, due to the increase in total required oil, the absolute sulfur dioxide emission into the air is expected to increase. Desulfurization of heavy oil and flue gas cleaning are the most effective methods of controlling emissions. The difficulties in desulfurization of heavy oil are the requirements of high temperatures, high pressures, large amounts of hydrogen gas, and preventing the formation of corrosive products. Flue gas cleaning has the disadvantage of high costs. The largest treating apparatus is under operation at Japan Synthetic Rubber Co. with a capacity of 200,000 cu m/hr. Pollution control through proper refinery siting is also considered.

21999

APTIC NO. 41454

Parks, Marion

THE HUMAN ENVIRONMENT. VOLUME II: SUMMARIES OF NATIONAL REPORTS ON ENVIRONMENTAL PROBLEMS 1972. Woodrow Wilson International Center for Scholars, Washington, D. C., Environment Series 201, 115p., March 1972. 71 refs.

The reports of more than 70 countries to the United Nations Conference on the Human Environment have been summarized. In preparing the summaries, care has been taken to describe each country in terms of geography, governmental organization, and population, especially in the case of newer nations. Each country has described its main problems, its regional and internal ecological characteristics, policy, recommendations for international arrangements, and request for assistance.

22000

APTIC NO. 42176

Rasch, Rudolf

EMISSIONS FROM INCINERATION PLANTS IN CASE OF REFUSE AND PLASTIC COMBUSTION. (Emissionen aus Muellverbrennungsanlagen bei Muell und Kunststoffverbrennung). Text in German. Muell Abfall, 4(3):88-100, June 1972. 21 refs.

The annual domestic refuse quantity per inhabitant is 250 kg and the quantity of industrial refuse amounts to 100 kg/inhabitant in the federal Republic of Germany. The quantity of

plastic refuse in the domestic waste is 2.5% of which 1/10 is polyvinyl chloride. The percentage of plastic waste in the refuse will rise to 5% in the future. Thirty-eight incineration plants in the Federal Republic of Germany burn about 4 million tons of domestic refuse. The sulfur dioxide emissions from large incineration plants amount to 12,000 tons, the hydrochloric acid emissions to 8000 tons, and dust emissions to 2000 tons/yr which is very low in comparison of the total emitted quantity in West Germany (amounting to 4,000,000 tons of SO₂, 50,000 tons of HCl, and 4,000,000 tons of dust). The large incineration plants use high chimneys to distribute the harmful emissions. Hydrochloric acid in the flue gases of an incineration plant leads to high temperature corrosion which can be controlled by technical means. The dust emission by incineration plants may amount to 40 g/cu m. By means of electrical filters or flue gas washing devices, a purity of 150 mg/cu m which is prescribed by the German Standards can be reached.

22001

APTIC NO. 41205

Raykov, I. Ya.

EJECTION OF TOXIC SUBSTANCES WITH EXHAUST GASES FROM TWO CYCLE MOTORCYCLE ENGINES. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopymi Gazami Avtomob., Proc. Symp., 2nd, 1971. Translated from Russian. 7p.

Carbon monoxide and hydrocarbons comprise over 98% of the total quantity of toxic substances in the exhaust gases of two-cycle motorcycle engines. Metering the delivery of lubricating oil to the engine results in a more complete utilization of the oxygen in the combustible mixture, thereby reducing the concentration of exhaust CO between 20 and 30%, exhaust hydrocarbons between 20 to 12%. At the same time there is some increase in the content of exhaust aldehydes, and oxides of nitrogen increase by a factor of 1.5 to 2.0. However, they are so small a part of the content that they have no particular effect on the toxicity of the exhaust gases. Conversion of two-cycle motorcycle engines to pump-regulated lubrication results in a reduction in the toxicity of the exhaust gases from engines of this type to approximately one-fifth.

22002

APTIC NO. 41538

Ridker, Ronald G.

POPULATION AND POLLUTION IN THE UNITED STATES. Science, 76(4039): 1085-1089, June 9, 1972.

Comparison of two U. S. Bureau of the Census population projections for the next 30 and 50 years and their effect on the environment point out the complexity of the issues facing the world population. One projection predicts a population of 440.3 million and another 299.2 million by the year 2020. The interaction of population and pollution appears to show an increase in pollution proportional to population growth. Population and per capita output appear to be equally important environmental parameters. When population and per capita output both increase, environmental damages increase more rapidly than when either grow alone. The lower projection for 2020 is more desirable, but there will be no great difference between the environmental effects, because a higher proportion of the population will be part of the labor force. Technological changes to be expected fall into four categories: changes in materials used/unit output, changes in residuals produced/unit output, changes in the emission of waste/unit of residuals produced, and changes in pollution/unit of waste. All these parameters are controlled by price and have thus far made our situation worse for exotic metals, and chemical compounds, and improved our condition with respect to biological waste, solids, and particulates. Since relative price changes have little direct correspondence with environmental quality, the effects of past technological change have been mixed and prediction of the effects of population interaction with technology are indirect and difficult.

16

22003

APTIC NO. 41985

Rosa, R. J.

MHD ENERGY CONVERSION: PRESENT DEVELOPMENT PROGRAMS AND GASEOUS FISSION REACTOR APPLICATIONS. Preprint, Georgia Inst. of Tech., Atlanta, 3p., 1970. 1 ref. (Presented at the Symposium on Uranium Plasmas: Research and Applications, Atlanta, Ga., Nov. 15-17, 1971.)

The past year has seen the beginning of a turnaround of the magnetohydrodynamics (MHD) effort due to the growing awareness of the environmental and other advantages of MHD. Primary objectives of the present work is to: demonstrate the long-duration capability of MHD ducts at a power level large enough to stimulate the internal operating conditions to a full-scale machine, and to study the systems for effluent control. The Electric Research Council Task Force on MHD agreed that future plans should culminate in the operation of coal-fired base-load pilot plant of approximately 50 MW capacity. In the meantime, foreign efforts in MHD have grown to sizable proportions, particularly in Japan, West Germany, and the U.S.S.R.

22004

APTIC NO. 41588

Ruff, Richard John, William Charles Verner, and Walter Anthony Denny

AFTERBURNER FOR OXIDIZABLE EXHAUST COMPONENTS. (Verbrennungseinrichtung zur Verbrennung oxydierbarer Abgasbestandteile). Text in German. (Universal Oil Products Co., Des Plaines, Ill.) W. Ger. Pat. Appl. 1,451,480. 5p., April 30, 1963. 8 refs. (4 claims).

The afterburner has a flame burner which injects the recuperatively preheated exhaust gases tangentially into the flame stream. The exhaust input surrounding the flame gas inlet is spiral and has at least one exit opening and a counterflow preheater for heating the exhaust gas using the flue gas. Preferably the preheater is a tube heat exchanger.

22005

APTIC NO. 41683

Ryazanov, V. A.

BASIC PROBLEMS OF SANITARY PROTECTION OF ATMOSPHERIC AIR. In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants. M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 6-13. Translated from Russian. (Also: Izv. Akad. Med. Nauk SSSR, vol. 10:5-15, 1967.)

NTIS: PB 209478

The problem of atmospheric pollution has become considerably more complex and difficult during its one-hundred-year history. New problems have arisen which have superseded the routine considerations that prevailed during the first half of the 20th century. Industrial chemistry and the struggle with automobile exhausts have now become the primary concern. The main objective with regard to exhaust gas emissions is the conversion of automobile transportation to electric power. The rapid development of industrial chemistry has occasioned the synthesis of hundreds of new organic compounds every year throughout the world, most of which have not been studied from the toxicological and physiological points of view. For this reason, chemistry should now be at the center of attention of public health science and in particular, atmospheric sanitation. To accomplish this, the work of graduate students should be switched broadly to problems of industrial chemistry, particularly synthetic chemistry, and priority should be accorded to the publication of materials dealing with research in the area of industrial chemistry.

22006

APTIC NO. 41032

Salihi, Jalal T.

THE ELECTRIC CAR--FACT AND FANCY. *IEEE (Inst. Elec. Electron. Engrs.) Spectrum*, 9(6):44-48, June 1972. 11 refs.

The environmental effects of widespread use of the electric car, particularly with regard to possible increased electric energy demands, are considered. At most, the operation of 180 million electric cars by the year 2000 would increase consumer electric-energy demand by about 14%. The effect of nighttime charging of future electric cars during nonpeak periods would yield a better utilization of the available electric power capacity and would reduce the relative cost of producing electricity. Emissions levels for heat engine vehicles and vehicles employing a heat engine-electric mix are projected to the year 2000. A factor of 10 appears to be a conservative ratio for comparing electric and heat-engine vehicles in terms of pollutant concentrations, assuming that nuclear power will provide 70% of the total energy demand of the country by the year 2000. Other advantages of the electric car are conservation of natural resources, improved import-export balance, adaptability to advanced transportation systems, and reliability and ease of maintenance.

22007

APTIC NO. 41570

Sanchez, R. Garzon

POLLUTION AND PLASTIC WASTES. POSSIBLE SOLUTIONS. (*Polucion y desechos de plasticos. Posibles soluciones*). Text in Spanish. *Rev. Plast. Mod.*, 23(189):363-371, March 1972.

By 1980, a 3600 g/day amount of refuse will be generated in the U. S., of which 3.0% will be plastic. Plastic wastes constitute no danger as yet as an air pollutant source. Pollution control from vinyl resin manufacturing plants is provided for by droplet trapping facilities as developed by Monsanto achieving 99.98% retention. Combustion and incineration of plastic refuse emits mainly carbon dioxide and water vapor except for polyvinyl chloride which with hydrochloric acid contributes to the air pollution. Pyrolytic procedures now in progress provide the possibility of recycling the gases generated in the absence of oxygen for fuel purposes within the system. Other technologies may retrieve the HCl generated by PVC by treatment with ammonia. Reference is made to the most recent incineration trends in the disposal of solid wastes. Pollution control in modern incinerators is planned by utilizing a closed circuit procedure allowing recycling of the generated hot vapors as an energy supply for the operation of the same facility. Degradation of plastics is performed best by means of specific enzyme systems or harmless microorganisms, however, extensive research in the field is still required.

22008

APTIC NO. 41076

Scheel, Jerold W.

A METHOD FOR ESTIMATING AND GRAPHICALLY COMPARING THE AMOUNTS OF AIR POLLUTION EMISSIONS ATTRIBUTABLE TO AUTOMOBILES, BUSES, COMMUTER TRAINS, AND RAIL TRANSIT. *Preprint, Society of Automotive Engineers, Inc., New York*, 12p., 1972. 22 refs. (Presented at the *Automotive Engineering Congress*, Detroit, Mich., Jan. 10-14, 1972, Paper 720166.)

An analytical method is described for estimating and graphically comparing the amounts of mass emissions from automobiles, buses, commuter trains, and rail transit given the emission characteristics of each type of vehicle. Emissions considered include carbon monoxide, hydrocarbons, nitrogen dioxide, and sulfur dioxide. These mass emissions are expressed in grams per person mile as well as grams per vehicle mile in order to consider their quantity based on the movement of people as well as on the movement of vehicles. The

relative effects of these pollutants are also presented. Information from this method can be used to estimate the quantity of emissions produced in a specific area given the travel characteristics of that area. Changes in the amount of emissions resulting from persons who change their mode of travel can also be estimated. Application of this method for a given region can help local officials estimate the effects of various transportation policies on the regional transportation related pollution. (Author abstract modified)

22009

APTIC NO. 42194

Schmid, G. and Weigelt, H.

EUTROPHICATION OF WATERS AND AIR POLLUTION BY MASS STOCK FARMING. (*Gewaesser-Eutrophierung und Luftverunreinigung durch Massentierhaltung*). Text in German. *Wasser Boden*, 24(5):134-138, May 1972. 8 refs.

Due to the increasing number of mass-stock farms which do business on an industrial level, the problem of water and air pollution becomes more and more critical. Since these farms keep animals on a large scale and do not have sufficient agricultural areas onto which the animal dung may be brought without endangering the environment, the effective areas pertaining to the mass-stock farms are over-fertilized by nitrogen and phosphates. In the hot summer months, large quantities of organic manure decompose and organically bound nitrogen is set free. This nitrogen is emitted into the air in form of ammonia. When storing the dung in deposit sites, the mineralization of the dung causes the production of gaseous odors.

22010

APTIC NO. 41207

Shteynberg, A. S.

EVALUATION OF THE TOXICITY OF THE AUTOMOBILE GAS TURBINE ENGINE. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhopnymi Gazami Avtomob.*, Proc. Symp., 2nd, 1971. 10 refs. Translated from Russian. 22p.

The automobile gas turbine engine with heat exchanger running under rated conditions has a toxicity which is lower than that of piston engines by a factor of approximately 10. The gas turbine engine rated at 1200 hp and used for a heavy dump truck has similar indices. Under low gas conditions this gas turbine engine has a three-fold advantage compared with the diesel engine in terms of toxicity. The gas turbine engine has an air consumption 80 times that of the gasoline engine of the same power rating when running at idling speed, yet its emission of toxic substances is lower by a factor of two than the emission from the gasoline engine with a 4.5% concentration of carbon monoxide in the exhaust gases. The automobile gas turbine engine manufactured in 1967, when tested on the California cycle, showed an emission of CO and hydrocarbons in grams per kilometer traveled that was lower than the 1970 U. S. standard for gasoline engines by a factor of 7.5. The emission of nitrogen oxides by weight by the 1967 automobile gas turbine engine is at the level of the standard proposed for introduction in the U. S. (2.5 g/kg), and is lower than that from piston engines by a factor of 5.7. Automobile gas turbine engines will provide the greatest gain in terms of reduction of toxicity, including reduction in nitrogen oxides, when used in trucks, where the degree of utilization of power is much higher than in passenger cars, when compared with the use of piston engines.

22011

APTIC NO. 40984

Sribner, N. G., B. I. Arlyuk, and L. G. Barbakadze

DUST LOSS OF PRODUCTS FROM ROTARY KILNS WITH THE ATOMIZED INTRODUCTION OF A SLURRY. (*Pyleunos produktov iz vrashchayushchikhnya pechey s podachey pul py raspylom*). Text in Russian. *Khim. Prom. (Moscow)*, 47(11):855-859, 1971. 8 refs.

The countercurrent rotary kiln with atomized delivery of pulp is used for drying and roasting of bauxite and slime charges in alumina production and for roasting of hydrate-sulfate-coke charge during complex treatment of alunite. The efficiency of the furnace is affected unfavorably by the large amount of products removed with flue gas. An equation is given for the determination of the amount of dust carried from the furnace. The equation is 0.785 times the dust concentration in the flue gas times the square of the diameter of the cold furnace times the rate of gas flow in the cold furnace times the density of the flue gas yields the amount of dust carried from the furnace. Decreasing the gas flow by increasing the diameter of the furnace was ineffective according to data on the Tikhvinsk alumina plant, and calculations showing the amount of removed products increasing with the increased diameter of the furnace are presented. Therefore, an increase of the furnace length, such as an increase in the length/diameter ratio, is the most effective means for decreasing fuel consumption and dust removal from the furnace.

22012

APTIC NO. 41669

Stear, James R.

MUNICIPAL INCINERATION: A REVIEW OF LITERATURE. Office of Air Programs, Research Triangle Park, N. C., Office of Technical Information and Publications. Pub-AP-79, 20pp., June 1971. 530 refs.

GPO: 5503-0009

Municipal refuse incineration as it is practiced in the United States and several foreign countries is discussed. The review concerns incineration of municipal refuse in incinerators that are owned and/or operated either by governmental or non-governmental groups. Such incinerators are large when compared to most non municipal such as domestic, industrial, and special purpose incinerators. The quantity of refuse generated and its present and future composition, as it relates to the incineration disposal method, is described. A study of incinerators in operation and under construction shows that in the past the United States concentrated mainly on volume reduction. At the same time, European countries were not only concerned with volume reduction, but also the use of refuse as a fuel for steam and power generation. Air pollution control devices for removal of particulate matter are of concern to every country. Electrostatic precipitators, used extensively in Europe, seem to offer one of the better solutions for highly efficient emission control on municipal incinerators in this country. The control equipment also includes scrubbers (spray walls, venturi scrubbers, wet cyclones, packed scrubbers, and flooded-plate scrubbers), cyclones, fabric filters, baffles, and settling chambers. Operating variables of incinerators such as pressure and temperature, maintenance, management, and personnel are mentioned. Incinerator emissions include particulates, nitrogen oxides, carbon dioxide, carbon monoxide, sulfur oxides, formaldehyde, hydrocarbons, and chlorine compounds. Particle size, standards, regulations, measurements, and chemical composition are discussed. Particulate, gas, and smoke sampling and measurement are mentioned. Costs, by-product recovery, site location, and research projects are discussed. Other disposal methods are dumping, open burning, sanitary landfill, composting, and swine feeding.

22013

APTIC NO. 42013

Straub, Hans

COMPOSTING OF REFUSE, THE MOST SUITABLE METHOD. (Kompostierung der Abfalle, sinnvollste Methode). Text in German. Umwelt (Duesseldorf), 2(3):56-61, June/July 1972. 5 refs.

The most suitable method to dispose of domestic refuse is the composting method, since compost can be used as soil amelioration substance. In the Federal Republic of Germany there are 15 compost plants and 20 homogenization plants in operation. The composting method provides for the greatest volume reduction of the refuse. Another advantage of com-

posting is the fact that domestic refuse and sewage sludge can be composted together, the sewage sludge without being previously dewatered. The sewage sludge improves the quality of the compost owing to its high nitrogen content and can be removed by this method very economically. Pathogenic substances contained in the refuse and in the sewage sludge are destroyed by the composting process. Before submitting the refuse-sewage sludge mixture to the composting process, glass and metallic parts have to be sorted out and the refuse must be shredded. The composting process can be accelerated by using rotting cells, drums or towers, providing for a favorable carbon-nitrogen ratio of the refuse, sufficient humidity and oxygen supply. Bad odors can be avoided in compost plants by cleaning the exhaust air in filters on the bottom of the rotting cell.

22014

APTIC NO. 41109

Striefler, Paul

ELECTRO CITY BUS WITH HYBRID DRIVE. (Elektro-Stadtomnibus mit Hybridantrieb). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(10):237-242, Oct. 1971. 8 refs.

Pollution-free operation of a city bus by battery powered electric motor drive would represent a very desirable arrangement. The size of battery and the recharging time required represent, however, an economic problem. A 16-ton bus with a battery weighing 6 t could operate on normal streets for four hours before recharging, carrying 26 passengers. A similar bus with a 4-ton battery could operate for two hours, carrying 65 passengers. Considering the fact that emission-free operation in suburbs is less essential than in the center of cities, the hybrid drive presents a good, practical solution. A prototype of a hybrid driven bus, built by Daimler-Benz in cooperation with Robert Bosch GmbH and Varta AG, has been in experimental use since 1969. The vehicle is a 16-ton two-axle bus. The hybrid drive includes a 100 HP, 6-cylinder Diesel engine which drives a DC generator; the latter supplies electric current to the main electric drive motor. The battery of 2 tons weight and 56 KWh capacity, made by Varta AG, is being charged by the generator and also recharged by outside network current when not en route. A typical test condition is an operation with 85 passengers capacity load, with a run of, for example 20 km, of which the first and last 5 km are with the switched-in Diesel power unit supplying the motor with electric current; crossing an inner city area over a stretch of 10 km takes place emission free, with the Diesel unit switched off and current supplied to the motor by the battery.

22015

APTIC NO. 41163

Tanabe, Yoshitaka

AIR POLLUTION CONTROL PLANNING IN OSAKA.

(Osaka ni okeru taiki osen hoshu no koso keikaku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):17-19, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Current problems and conditions of air pollution in Osaka are discussed with a view toward planning an effective air pollution program for the city. The coastal industrial areas including Amagasaki, Osaka, Sakai, and Northern Izumi emitted an average of 263 ton/sq km/year stack gas in 1965, although in some areas the tonnage was as much as 1928. Industries include electric power plants and plants for manufacturing steel, ceramics, chemicals, and textile, all of which emit large amounts of sulfur dioxide in various wards facing this industrial complex, the average SO₂ concentration in 1967 was more than 0.1 ppm at all times. A change of fuel is mandatory, and if necessary, change of stack sites, installation of collective flues, and planning of buffer areas such as parks, woods, warehouses, motorpools, and sewage treatment plants. The center of Osaka has more than 50 buildings higher than 31 m. In strong winds, the buildings receive stack gases and soot directly from low stacks; on windless days, the irregular

ground surface and slow change of temperature in the building area cause stagnation of polluted air. Collectivization of stacks by means of a centralized heating and cooling system will be necessary. In three wards designated as strictly industrial, there are still 14,529 residences, and in areas designated as residential, a total of 2827 factories remain. Generally, areas with SO₂ concentrations above 0.5 ppm are increasing. Some meteorologic characteristics and winter smogs are discussed as well as pollution problems of western countries.

22016

APTIC NO. 42283

Tarasov, V. V.

VOLATILE PRODUCTS EMITTED DURING THE MANUFACTURE OF COTTON SEED OIL. (*Исследование продуктов, выделяющихся при производстве хлопкового масла*). Text in Russian. *Gigiena i Sanit.* 35(5):96-97, May 1970. 2 refs.

Volatile products emitted during the manufacture of cotton seed oil were analyzed by heating intermediate products to 120-150 C. The gases released were absorbed in three different solvents (ethanol, distilled water, and methanol) to determine unsaturated hydrocarbons, aldehydes, and volatile fatty acids, respectively. The unsaturated hydrocarbons were analyzed by using the iodine titration method, and colorimetric method using fuchsin was applied for aldehydes. The volatile fatty acids were determined in a reaction with ferric chloride to form hydroxamic acid. Spectrophotometric determination using ethanol as absorbent revealed compounds containing carbonyl groups at an absorption peak of 273 micron. Fatty acids were identified by means of paper chromatography, using petroleum ether for desorption from the silicagel and ammonia as carrier gas. Furfural, as well as propionic and enanthic acids were identified which were indeed detected in cotton seed oil manufacturing shops.

22017

APTIC NO. 41674

Warner, A. J.

SOME CURRENT THOUGHTS ON THE ROLE OF PLASTICS IN ENVIRONMENTAL PROBLEMS.

Preprint, Chemical Inst. of Canada, 1971. 1 ref. (Presented at the Symposium on Polymers and the Environment, Halifax, Nova Scotia, May 30-June 2, 1971.)

Approximately 3 million tons of plastics were disposed of in 1970, and this figure may rise to 5.3 million tons by 1976. At the present time the approximate composition of plastics in solid wastes is 54% polyolefins, 20% polystyrene, and 11% polyvinyl chloride, the remaining 15% being made up of many other substances including thermosets such as phenolics and melamines. Of the present methods of disposal of residential, commercial, and industrial solid wastes, the following are examined: uncontrolled dumping, landfill, incineration, and litter. Disposal methods currently under active investigation include pyrolysis, recycling and compaction, and bailing. The presence of plastics in sanitary landfills poses no problems regarding the subsequent use of the site for normal land use, provided that no large pockets of air are left in the landfill from inadequate crushing and compaction. The plastics act as inert material, and tree and shrub roots have shown no ill effects when grown on such soils. Recent developments in plastics research have been directed toward enhancing their rapid breakdown, with some measure of success for the polyolefins, and especially polypropylene already established. Properly incinerated plastics give no particulate matter in the stack gases. For a material like polystyrene, initial burning gives rise to considerable black smoke, but this smoke, and other unburned hydrocarbons in the gas stream, are completely burned in the second stage of the incinerator. The products of the burning are carbon dioxide, water, and when polyvinyl chloride is present, hydrochloric acid. Pyrolysis has not yet been established as a feasible alternative to incineration. Reclamation and reuse of plastics is not possible at present because means have not been found to sort out plastics from other

wastes or to utilize the conglomerate plastic material which a possible recycling treatment would produce.

22018

APTIC NO. 41290

Weaver, Billy Don

STATEWIDE EMISSION INVENTORY FOR OKLAHOMA. (FINAL REPORT). Geomet, Inc., Rockville, Md., Environmental Protection Agency Contract 68-02-0042, GEOMET Rept. EF-58, 76p., Oct. 15, 1971. 6 refs.

NTIS: PB 203812

A detailed statewide emissions inventory of particulate, sulfur oxide, hydrocarbon, carbon monoxide, and nitrogen oxide sources of atmospheric pollution is presented. The data represent estimates of emissions for the year 1970, based on questionnaires provided by individual firms in response to mailed solicitation. Using these data, over 800 sources were selected for point source processing using any source emitting 1 ton/yr or more. Additional data on statewide fuel usage, vehicular traffic, waste disposal, solvent evaporation, aircraft activity, agricultural fuel use, gasoline handling losses, petroleum storage losses, and natural gas production losses were collected and processed as area sources. Estimated annual emissions are: particulates, 159,329 tons; sulfur oxides, 30,929 tons; carbon monoxide, 1,261,715 tons; hydrocarbons, 327,855 tons; and nitrogen oxides, 298,841 tons. The major source of particulate emissions in all but one of the Air Quality Control Regions in the area is from process sources. Sulfur oxides emissions are primarily from three of the major source categories: fuel combustion, process sources, and transportation. The principle source of carbon monoxide and nitrogen oxides is transportation. Hydrocarbon emissions are due primarily to transportation sources and to petroleum storage and solvent evaporation.

22019

APTIC NO. 41955

Wolfrum, Juergen

FORMATION OF NITROGEN OXIDES ON COMBUSTION. (*Bildung von Stickstoffoxiden bei der Verbrennung*). Text in German. *Chem.-Ing.-Tech.* 44(10):656-659, 1972. 20 refs. (Presented at the 6. Dechema-Jahrestagung, Frankfurt, West Germany, June 24-25, 1971.)

More atmospheric nitrogen is fixed during combustion processes than in the relevant branch of the chemical industry. A quantitative description of nitric oxide formation during combustion with the aid of reaction rate chemistry shows that NO is mainly formed in the hot combustion gases after passage of the flame front. The amount of NO can be reduced by lowering the oxygen concentration and the maximum temperature during combustion. This can be accomplished by multistage combustion, partial recirculation of waste gases, and addition of water vapor. Catalytic conversion of NO into nitrogen after combustion is possible with the addition of N₂, ammonia, and carbon monoxide.

22020

APTIC NO. 41275

Zayichek, Z.

SMOKING AT THE EXHAUST IN THE CASE OF COMPRESSION IGNITION ENGINES AND THE EFFECT OF WEARING OF CERTAIN PARTS IN FUEL PUMPS ON ITS MAGNITUDE. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, *Smizheniye Zagryaz. Vozdukh Gorodikh Vykhlopymi Gazami Avtomob.*, Proc. Symp., 2nd, 1971. Translated from Russian. 6p.

Studies were conducted to determine smoking from the exhaust of a new engine after it was broken in; exhaust smoke from the same engine with a worn fuel pump; the percentage increase in exhaust smoke by the engine as a result of wearing of the fuel pump delivery valves only; and the percentage of smoke increase as a result of wearing of the fuel pump plunger

pairs. A six-cylinder in-line compression ignition automobile engine equipped with a high-pressure, plunger type fuel pump was used. It was found that increased smoking at the exhaust of an engine is primarily the result of an increase in the angle of advance of fuel injection as a result of wear in fuel pump parts, so reduction in exhaust smoking requires an increase in the wear resistance of fuel pump parts or an increase in their service life.

22021

APTIC NO. 41738

Zeilinger, K.

FUELS WHICH DO NOT HAVE HARMFUL EFFECTS ON THE ENVIRONMENT. (*Umweltfreundliche Kraftstoffe*). Text in German. Umschau (Berlin), 72(10):322-323, May 1972. 3 refs.

The problems of fuels with minimum harmful effects on the environment and the basic trends in this area are outlined. The carbon monoxide and hydrocarbon contents in exhausts are largely dependent on the excess-air ratio, while nitric oxide is formed at high temperatures. Fuels with minimum harmful effects on the environment should satisfy several requirements: high volatility and low viscosity for minimum hydrocarbon and CO emission; wide range of ignition temperatures for minimum hydrocarbon, CO, and NO emissions; low rate of combustion for minimum NO; high octane number with low lead content; purification of carburetor, suction pipes, and combustion chamber; and minimum smoke from diesel fuels. Some of these requirements cannot be realized by the available technical means. Due to the reduction of lead content, changes in the structure of hydrocarbons are necessary, while hydrocarbons with chain structure will be preferred to aromatic hydrocarbons. The compression rate will be reduced due to the decrease in the octane number in a near transitory period. While the changes in the fuel structure are not likely to entail important changes in the exhaust composition, there are no additives available for widening the ignition temperature range. Cyclohexane, added to diesel fuel at a rate of about 3% by volume as a smoke inhibitor, reduced soot, CO, and NO emissions. ■

22022

APTIC NO. 41610

Zubiaur Isasi, Jaime

COMMENTS ON POLLUTION. (*Comentarios sobre la contaminación*). Text in Spanish. Dyna (Madrid), 46(7):325-333, July 1971.

Winds, temperature variations, and solar radiation constitute the main factors affecting the atmospheric condition in polluted urban areas. Therefore, a thorough study should be made whenever new industrial plants are to be erected. More than 100 pollutants emitted by the three main emission source categories, domestic heating, industrial plants, and automotive traffic had been identified, so far. Of these, sulfur dioxide is generated by the combustion of different fuels. Certain coals may contain up to 6.0% sulfur. The atmospheric dilution processes prevent SO₂ concentrations from exceeding 2000 mg/cu m. However, the noxiousness of SO₂ is enhanced by its conversion into sulfur trioxide occurring through a photochemical process in the gaseous phase, and through a catalytic process occurring in the liquid phase (fog droplets) which converts SO₃ into sulfuric acid aerosols. The presence of ammonia in the polluted air neutralizes part of the generated sulfuric acid and thus promotes the progress of the reaction producing the acid smog. Hydrogen sulfide is a pollutant emitted mainly by petroleum refining or processing plants. Carbon monoxide resulting from incomplete combustion processes is emitted mainly with the automobile exhaust in urban areas. Both aliphatic and aromatic hydrocarbons are also a constituent part of the incomplete combustion. Solid particles are generated mainly by incinerators and carried by flue gases. Included is a review of the most dramatic air pollution episodes which occurred between the 1930s and mid 1950s in the Meuse Valley in Belgium, in Donora Pennsylvania, and

in London. Since air pollution is not limited by national boundaries, its abatement should be attempted not only by local but also by international efforts.

22023

APTIC NO. 41214

Zvonov, V. A. and V. N. Malakhov

INVESTIGATION OF THE FORMATION OF OXIDES OF NITROGEN IN THE CYLINDER OF A GASOLINE ENGINE. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukh Gorodakh Vykhopnyimi Gazami Avtomob., Proc. Symp., 2nd, 1971. 9 refs. Translated from Russian. 13p.

The influence of the boundary layer and of gasoline engine operating conditions on the formation and decomposition of nitrogen oxides in the engine cylinder was investigated. Tests were run at different engine crankshaft speeds (800, 1275, and 1800 rpm), different excess air factors during combustion (0.85, 0.98, and 1.08) and different angles of advance of ignition (20, 38, and 49 deg before top dead center). The results showed that the boundary layer has a significant effect on the NO_x concentration. There are large gradients in NO_x concentration during combustion and expansion in the main mass of gas in the cylinder. Adequate mixing does not occur. Marked decomposition of NO_x during the expansion process was essentially absent. Gas samples must be taken over many cycles and oscillograms must be statistically processed in order to obtain characteristic curves for a particular operating condition because the nonuniformity of the working process of a gasoline engine is so great. Mean gas temperature during combustion, in terms of cylinder volume, leads to an explanation of some cases of change in the NO_x content in the engine cylinder, but is not a definitive criterion for a quantitative and qualitative assessment of the emission of NO_x, even for the same air-fuel ratio.

CONTROL METHODS

22024

APTIC NO. 41028

FILTERS FOR DUST CONTROL. F. 1 Mfr., 47(5):52-53, May 1972.

Dry fabric filters are the only practical answer to the dust control problems in the food industry. The removal of the dust from the filter fabric determines the utility of a filter in a particular process. The mechanically shaken filters are suitable for intermittent processes. To achieve semicontinuous ratings the filters are sectionalized and sequenced shaking and/or compressed air backwash may be used. This demands short interval cleaning and high fabric strength. A good dust control system has a motorized shaker, and permits easy access to filter elements. Reverse jet filters are replacing sectionalized mechanical bag filters because they can filter heavy loads at high velocities with a constant level of resistance. Efficiency often exceeds 99.99%. Reverse jet filters have no moving parts and are more compact than mechanically shaken bag filters.

22025

APTIC NO. 41117

EXHAUST GAS EMISSION OF THE INTERNAL COMBUSTION ENGINE. (*Angasemission beim Wankelmotor*). Text in German. Motortech. Z. (Stuttgart), 33(6):260-261, June 1972.

The entirely different combustion process in the rotary engine renders it independent of knocking problems. Tests with low-octane (67) and with high-octane gasoline brought the same operating efficiency. The operation of the engine with lead-free gasoline is thus feasible. The exhaust gas of rotary engines contains somewhat more hydrocarbons than that of piston engines, the same quantity of carbon monoxide, and less nitrogen oxides. The hydrocarbons and carbon monoxide

can be relatively easily removed by a catalytic afterburner. The reduction of the oxides of nitrogen concentration by exhaust gas return and mixing with the intake mixture produces the desired decrease of the combustion temperature but simultaneously a 20 to 30% power drop which increases the specific fuel consumption.

22026

APTIC NO. 41127

THE DUST COLLECTION POLICY OF OUR PLANT.

(*Wagasha ni okeru taisaku*). Text in Japanese. Osaka no sora (*Sky Osaka*), no. 14:11-15, March 1972.

Sulfur oxides and particulates are the major pollutants from a cement factory, the former results from the combustion of heavy oil and the latter from the flue gas and from the manufacturing of cement. Forty-nine bag filters with filtering area ranging from 40 to 1200 sq m were used in the dust collection of all sources except that from flue gas. Cyclones were used for flue gases from a residue water dryer and clinker cooler. The capacity for the former was about 20,000 N cu m/hr, and for the latter, about 70,000 N cu m/hr. The particulate concentration from the clinker cooler decreased from 0.08 to 0.1 g/N cu m in one of the factories, but further decreased from 0.02 to 0.03 g/N cu m at another factory with an electric dust collector. The efficiency of an electric dust collector depends on the time of charge-bearing of the gas. The collection efficiency could be increased by decreasing the distance between the two electrodes and by adjusting the gas to give a homogeneous flow.

22027

APTIC NO. 41133

ASSAULT ON THE AIR WE BREATHE. *Australasian Engr.* (Sydney), 1972:16, 18, 19, April 1972.

Pollution of Australia's air resulting from coal burning, quarrying, clay products, metal products, oil refining, chemical, artificial fertilizer, rubber, cement, aluminum, paint, and many other industries is discussed in connection with emission controls available for combating the problem. The cyclone, a device for cleaning dust laden ventilation air, utilizes centrifugal force to separate dust particles from the main air stream. However, since the efficiency of the cyclone is dependent on the mass of the particle, it is suitable only for dusts which consist mainly of large particles. Another device known as a wet collector uses either an induced or forced spray of water mist to agglomerate dust passing through the collector. Although this type of collector can remove particles down to one micron at an efficiency of 95%, its costs of operation is high. Also available are electrostatic precipitators which utilize high voltages and the ionization principle to electrically charge dust particles in an air stream and cause them to move to collecting electrodes for disposal. Reasonably high efficiencies are possible, but capital costs are high and efficiencies are very dependent on stable dust and air flow conditions. The most widely accepted and inherently efficient device is the bag or fabric collector. Furthermore, no penalty in cost or operating horsepower requirement is involved to assure efficiency. Fabric bags filter the dust out of the air stream and automatic shaking or reverse air flow may be used to remove the collected materials from the dust tubes. These fabric filters commonly provide efficiencies in excess of 99% on dust sizes down to the sub-micron range. Also, these filters can be designed to automatically eject collected dust without requiring the shut down of the plant and, as a result, are capable of operating 24 hr/day.

22028

APTIC NO. 41137

ODOR CONTROL: A SPICY STORY. *Water Pollution Control* (Toronto), 110(5)60, May 1972.

Stange Canada Ltd., one of Canada's largest companies involved in the packaging of exotic spices of all types and varieties, installed an air control system in its plant in Malton, Ontario. The company's management agreed in the early stages of design that the main task of any system to be installed should not be only the collection of dust, but also control of

the total atmosphere in the plant's processing and packaging rooms. Air in the production and packaging area is controlled by two independent high velocity air handling systems. At each of the three grinders, two nozzles are placed at points where dust might escape. These nozzles are closely adapted in their shape to the vessels used in spice handling, and are of a design developed originally for the collection of vapors, as the submicron aromatic spice components behave in many ways like a vapor or gas. Air collected at these spots is led through stainless steel risers to a galvanized horizontal duct, suspended from the ceiling at an incline to allow the frequent flushing of the system with water. The horizontal ducts lead to a bag dust collector.

22029

APTIC NO. 41140

DUST SUPPRESSION. *Rock Prod.*, 75(5):137, 154, 156, May 1972.

There are two basic approaches to the elimination of dust in handling and storing material that contains very fine particles. The most commonly used is a dust control system that works for the suppression of dust through receiving, crushing, conveying, and stockpiling operations. The other employs a chemical spray that binds together the uppermost particles and forms a protecting crust on the surface of the stockpile. To counter wind blowing across a stream of falling material, rock ladders, telescoping chutes, or lowering wells are effective. Dusting can be limited by reducing the distance through which the material must fall. Spray systems contain four elements which are varied to suit the unique requirements of each specific dust control problem: the chemical compound, a surface active agent; proportioning equipment, to mix the agent with water in the required proportions; distribution system, to deliver the solution to the points of application; and actuating controls, to automatically control application of the chemical solution to the flow of material.

22030

APTIC NO. 41221

Hungarian People's Republic, Ketucki Group

INSTRUMENTS AND METHODS FOR REDUCING THE TOXICITY OF EXHAUST GASES FROM VEHICLES WITH GASOLINE ENGINES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopyni Gazami Avtomob.*, Proc. Symp., 2nd, 1971. Translated from Russian. 9p.

The monitoring of engine parameters when different types of emission control devices are installed on a vehicle is important. These devices can function efficiently only under definite conditions, within a limited range of engine operation parameters. Operations carried out when servicing vehicles include checks of the condition of the cylinder and piston assembly, gas distribution mechanisms, feed system, and ignition system. The condition of the ignition system and particularly the feed system of the carburetor engine are basic in determining the quality with which the combustion process evolves. Instruments used for technical diagnostics of an engine are enumerated.

22031

APTIC NO. 41268

Central Scientific Research Inst. of Automobiles and Automobile Engines (USSR)

THE PRESENT STATUS OF THE PROBLEM OF REDUCING AIR POLLUTION CAUSED BY AUTOMOBILE EXHAUST GASES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopyni Gazami Avtomob.*, Proc. Symp., 2nd, 1971. Translated from Russian. 6p.

Toxicity of exhaust gases depends on the technical condition of the automobile, and on observing requirements for adjustments. Increased attention is being given to monitoring, maintenance, and adjustment of the feed systems. Careful attention

to fuel system adjustments reduces emissions as much as 40% compared with unmonitored automobile operation. Improvement in existing processes and the development of new operating processes for automobile engines are also helpful. Work is underway on direct gasoline injection. Other projects include the design of catalytic neutralizers for automobiles working in quarries and closed spaces, equipment for conversion to liquified gas, and use of new fuels.

22032

APTIC NO. 41271

Hungarian People's Republic, Ketucki Group

CERTAIN FACTORS INFLUENCING REDUCTION IN THE EJECTION OF TOXIC SUBSTANCES WITH THE EXHAUST GASES FROM GASOLINE ENGINES.

Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukh-Gorodakh Vykhopnyimi Gazami Avtomob. Proc. Symp., 2nd, 1971. Translated from Russian. 9p.

The effect of mixture composition on the content of toxic substances in automobile exhaust gases was investigated. The beginning of the increase in carbon monoxide concentration corresponds to minimum specific fuel consumption. Thus, fewer toxic substances are ejected when the engine is running on economical mixtures. An improperly operating carburetor can be one of the causes of a high content of toxic substances in the exhaust gases. The average percentage indices for content of toxic substances, power, and specific fuel consumption are given. A similar reduction in the ejection of toxic substances is noted under partial load conditions. The most desirable approach to reducing the toxic emissions under partial load conditions is to set a higher low idling speed than ordinary (600-800 rpm) and use a leaner mixture, or reduce the amount of it, until rpm do not decrease. The effect of ignition advance, fuel octane number, and coolant temperature were also investigated.

22033

APTIC NO. 41354

Chemical Construction Corp., New York, Consulting Div.

THE HIGH SULFUR COMBUSTOR. A STUDY OF SYSTEMS FOR COAL REFUSE PROCESSING VOLUME I. (NARRATIVE SUMMARY). (FINAL REPORT). National Air Pollution Control Administration Contract CPA 22-69-151, 224p., Feb. 1971. 50 refs.

NTIS: PB 203958

The pyritic sulfur content of some bituminous coals can be reduced by gravimetric separation, or washing. The extraction of energy and sulfur value contained in the reject fractions is technically feasible. Under favorable conditions the sale of extracted energy and sulfur products will to some degree offset the cost of washing. The report includes preliminary designs and evaluations of several combustion and flue gas treating systems for processing high sulfur fuels that may be drawn off from the rejects of coal washing. These include catalytic oxidation, the contact process, the Reinluft process, magnesium scrubbing, absorption, amine absorption, aluminum sulfate absorption, alkali metal sulfite/bisulfite and SO₂ reduction. These fuels will need to be made up to specifications that depend first on the requirements of available processes for sulfur value recovery, and second on the limitations of combustion equipment in respect of ash. The HSC Fuel specifications can evidently be satisfied by appropriately re-combining selected portions of reject material from deep cleaning of coal. Four specimen HSC Fuel compositions are tabulated together with product and cost data on six processing systems for these fuels. (Author abstract modified)

22034

APTIC NO. 41443

INCINERATION. Ind. Gas, 52(9):11-14, May 1972.

The Allegheny Ludlum gas incinerator system at the Brackenridge Works is reportedly the first large multi-stage unit to be installed in the Pittsburgh area. It is approved by the Al-

legheny County Health Dept. and passes regular inspections by the county. The system uses a three-stage principle. The first stage chamber uses a 7 million Btu/hr natural gas burner and operates from 500 to 1250 F. The second stage is set to maintain 1400 to 1600 F with a 3.5 million Btu natural gas afterburner. In the final stage, completely burned gases exit the incinerator, and incombustible particles are removed by a three-stage wet scrubber which removes particles as small as five micron. Scrubbed flue gases are vented through a thirty foot stack. Any component failure is registered on an on-site control panel which automatically puts the system into fail-safe condition. Water from the wet scrubber is treated and is returned to the adjoining Allegheny River and is within the County's new strict requirements for cleanliness. The system is designed to handle two t/hr and saves an average of a half hour of truck and labor time over previous methods employed per load. On a seven day basis, the system reduces some 420 cu yd of waste to one cu yd of dry, sterile ash.

22035

APTIC NO. 41475

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs and Southwest Research Inst.

GUIDE TO REDUCTION OF SMOKE AND ODOR FROM DIESEL-POWERED VEHICLES. OAP Pub-AP-81, 31p., Sept. 1971.

GPO: 5503-0028

Odor and smoke from diesel-powered vehicles can be minimized by the following methods: increase in air-fuel ratio, engine derating, vehicle and engine maintenance programs including correction of faulty fuel injectors and restricted air cleaners, turbocharging at high elevations, replacement in two-cycle engines of the original crown-type injectors with needle-type unit injectors, avoidance of excessive engine idle and underspeeding, use of a straight vertical stack terminating as high above the ground as possible, and careful selection of fuels and fuel additives. General characteristics of diesel engines are described.

22036

APTIC NO. 41479

Japan Synthetic Rubber Co., Ltd., Arabian Oil Co., Ltd. (Japan), and Mitsubishi Chemical Machinery Mfg. Co., Ltd. (Japan)

CONCERNING THE PLANS FOR PUTTING INTO OPERATION THE WELLMAN LODGE SMOKE DESULFURIZATION EQUIPMENT. (Ueruman rōdo shiki haen datsuryu sochi no jishu keikaku ni tsuite). Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., 17p., Sept. 1971.

A joint venture by a fuel supplier, a plant builder, and a fuel user to build a set of boiler smoke desulfurization equipment at a synthetic rubber plant is described. The ground plans, plant outline and operation, control equipment, and costs of the venture are reviewed. The method is based on the principle of the wet type absorption of sulfur dioxide on a dense aqueous solution of sodium sulfite. The exhaust gas containing SO₂ is washed by the prescrubber and the solids in the gas and most of the sulfur trioxide are removed by the drain water. The washing-absorbing and regeneration-recovery processes are described. The SO₂ recovered has an extremely high purity and is processed by sulfuric acid manufacturing equipment of a new design. Market potentials for possible by-products from the process including concentrated sulfuric acid, elementary sulfur, gypsum, Glauber's salt, sulfite soda, ammonium sulfate, and liquefied SO₂, are tabulated.

22037

APTIC NO. 41552

Air Pollution Control Assoc., TI-3 Petroleum Committee

CONTROL OF ATMOSPHERIC EMISSIONS FROM PETROLEUM STORAGE TANKS. J. Air Pollution Control Assoc., 21(5):260-268, May 1971. 11 refs.

There are four basic tank designs for controlling emissions from petroleum storage tanks: fixed-roof tanks; floating roof tanks, including conventional open type and covered float tanks; variable vapor space tanks; and pressure tanks. Each is designed for special storage requirements and has special requirements for accessories, maintenance, and efficient operation. The causes of emission from petroleum storage are breathing loss, standing storage loss, filling loss, emptying loss, wetting loss, and boiling loss. Parameters which effect evaporation loss are true vapor pressure, temperature changes in the tank, tank outage, tank diameter, tank conditions, and type of tank. Recommended methods for the calculation of hydrocarbon vapor emissions from tanks are described.

22038

APTIC NO. 41560

Osaka Prefectural Government (Japan)

INVESTIGATION OF ACTUAL CONDITION OF DESULFURIZATION SYSTEM FOR STACK GASES. (Haen datsuryu sochi no jittai chosa ni tsuite). Text in Japanese. Osaka no Sora (Sky Osaka), no. 14:57-60, March 1972.

There were 38 flue gas desulfurization apparatus in operation in the entire country, 37 wet-types and one dry-type with capacities ranging from less than 5000 N cu m/hr to more than 200,000 N cu m/hr. Details of several apparatus were tabulated with brief descriptions of the processes, and the capacities. The desulfurization apparatus of factories in Osaka Prefecture were mostly medium size, and one point in common was that the recovery of useful sulfur compounds was not in effect most were abandoned in waste water. A new regulation issued on Sept. 10, 1971 required all desulfurization apparatus equipped with a continuous sulfur oxide analyzer.

22039

APTIC NO. 41563

PROCESSING TECHNOLOGY AND ITS APPLICATION. AN INTERDEPARTMENTAL SCIENCE BRANCH. II. THE MECHANICAL PROCESSING TECHNOLOGY. (Verfahrenstechnik und ihre Anwendung. Ein Interdisziplinärer Wissenschaftszweig. II. Die mechanische Verfahrenstechnik). Text in German. Oel Gasfeuerung, (5):444-451, May, 1972.

Fundamentals of different crushing and separating processes are outlined. The separation of solid fractions can be made by dry and wet sifting, for which the respective lower limits lie at 0.1 and 0.05 mm, while particles with a minimum diameter of 5 micron can be separated by means of gravitational sifting processes. Solids can be separated from liquids by sedimentation, filtration, and centrifugation. Since filtration techniques are generally more expensive than sedimentation, the latter are preferred to filtration wherever possible. The lower limits of separation for closed type and filter centrifuges lie below 0.01 and at 0.1 mm, respectively. The separation of solid and liquid particles such as pigments (2 micron), cement, coal dust (100 micron), smokes, and vapors (0.01-1 micron) can be made by means of inertia, filtration, electrostatic charge and ultrasonics. The inertia of the particles carried by the gas flow is utilized in chamber separators, impactors and cyclones. Filtration is applicable in a range of 0.2-100 micron. The electrostatic separation is suitable for the removal of fine dusts, smokes, and aerosols, just as the ultrasonic separation.

22040

APTIC NO. 41566

Japan Blower Industries, Ltd.

DUST COLLECTION SYSTEMS MANUFACTURED BY JAPAN BLOWER INDUSTRIES, CO. LTD. (Nihon burou kogyo (kabu) sei shujin sochi ni tsuite). Text in Japanese. Osaka no Sora (Sky Japan), no. 14:37-38, March 1972.

Four dust collectors produced by Japan Blower Industries are described. The JBI-Y model is a horizontal wet type dust collector. The contact of gas and water is by counterflow. It has a gas treating capacity of 500 to 12,000 cu m/hr, depending on the size of the collector. The JBI-L model is a vertical wet

type dust collector with a gas treating capacity ranging from 6000 to 30,000 cu m/hr. Major advantages of the above machines were complete contact of gas and water; compactness and economics; possible adjustment to 100% efficiency; and suitability for high temperature gas. The NC type cyclone collector is equipped with a spray nozzle at the gas entrance for the purpose of causing coagulation of the particulates. This collector is suitable for dust with a diameter ranging from five to 100 micron. It can be used for treating high temperature gas, and for high dust concentration gas. The NJB model bag filter has a gas treating capacity ranging from 15,000 to 25,000 cu m/hr. The efficiency of this type of collector is as high as 99%. Thermal and acid proof filter cloth is used that provides longer life of the filter. High efficiency of collection can also be accomplished for treating dust of 0.1 micron to 50 micron in size at low pressure loss with bag filters.

22041

APTIC NO. 41649

Kellogg (M. W.) Co., Piscataway, N. J., Research and Engineering Development

EVALUATION OF SO₂ - CONTROL PROCESSES. (FINAL REPORT). Office of Air Programs Contract CPA 70-68, Rept. RED-71-1257, Task 5, 76p., Oct. 15, 1971. 27 refs.

NTIS: PB204711

An economic evaluation of 12 sulfur dioxide control processes is presented. The evaluations are estimates of the increased cost of a power plant in which the process is installed and based on a power plant in which the process is installed and based on data available when the study was made in 1971. The results provide a reasonably accurate comparison (within 30%) of the investment cost of SO₂ control processes. The processes include limestone scrubbing, dry injection of limestone, catalytic oxidation, molten carbonate, potassium formate, ammonia scrubbing (base), ammonia scrubbing (steam stripping), ammonia scrubbing (thermal decomposition), Tyco process (modified chamber for removing nitrogen oxides and SO₂) magnesium oxide scrubbing, zinc oxide scrubbing, and citrate process. Actual investments ranged from a low of \$9.7/KW for dry limestone injection to a high of \$43.4/KW for the Cat-Ox process. By-product recovery was included in the cost analysis. Elimination of fly ash is briefly mentioned.

22042

APTIC NO. 41672

COAL PREPARATION...QUALITY FOR ALL MARKETS. Coal Age, 73(10):146-158, Oct. 1968.

Currently employed equipment and procedures for coal preparation are described. The practices discussed involve raw-coal handling, wet and dry coal cleaning, drying and dust collection, crushing and sizing, storage and loading, and refuse disposal. For each area, several individual plant facilities employing recently developed techniques are described in detail. Water washing is often used to clean coal. It is followed by drying. During drying, gases are cleaned by scrubbing, centrifuges, and thermal drying. 0

22043

APTIC NO. 41679

TRW Systems Group, Redondo Beach, Calif. and Scott Research Labs., Inc., San Bernardino., Calif.

THE ECONOMIC EFFECTIVENESS OF MANDATORY ENGINE MAINTENANCE FOR REDUCING VEHICLE EMISSIONS. VOLUME III. INSPECTION/MAINTENANCE PROCEDURES DEVELOPMENT. APRAC Proj. CAPE-13-68, APTD-1075, 194p., Aug. 20, 1971. 11 refs.

NTIS: PB 209953

Experiments performed to develop, characterize, and rank vehicle inspection and maintenance procedures are described. The experimental data were developed from the following sequence of investigations: an engine parameter field survey to characterize the general maintenance state of vehicle emission

control systems; a screening experiment to select the most frequent and extensive malfunctioned engine parameters; and a definitive experiment to select and evaluate the most effective parameters to maintain in an inspection as determined by combining the data from the previous two experiments. Inspection procedures using both direct engine parameter and emission diagnosis were developed with these data. The most frequently occurring out-of-specification parameters which are known to have or suspected of having significant effects on emissions were ignition timing, vacuum advance, medium load induction, idle speed, idle fuel-to-air ratio, air cleaner restriction, and float level. Other parameters having significant effects on emissions but with low malfunction frequencies were misfire, air injection, and positive crankcase vent valve. The most effective engine parameters to maintain in the general population are secondary ignition system (sparkplugs, wiring when causing misfire), idle timing, rpm, and fuel-to-air ratio, air cleaner, positive crankcase vent valve, and air injection system. Composite emissions were not very sensitive to choke blade setting with heat riser operating nominally, but were very sensitive to blade setting with the heat riser valve frozen open. Eight of the eleven power trains evaluated had linear emission responses to air cleaner restriction. Nitric oxide, carbon monoxide, and hydrocarbon emissions were measured.

22044

APTIC NO. 41780

DISCUSSION OF THE THEMES IN GROUP THREE: OCCURRENCE AND COMBATING ODOR EMISSIONS.

(Diskussion zu Themen der Gruppe 3 (Auftreten und Bekämpfung von Geruchsemissionen). Text in German. Schriftenreihe Ver. Wasser-Boden-Luftthyg. (Berlin), no. 35-95, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Plants which emit large quantities of solvents increasingly turn to thermal afterburning for odor elimination. Every hydrocarbon can be destroyed by thermal afterburning, provided the temperature is sufficiently high. The method is relatively expensive if the heat is not utilized. In some cases, the waste heat could be used for preheating the incoming gas mixture which saves fuel for the actual afterburning process.

22045

APTIC NO. 42000

FUME CONTROL ON THE ELECTRIC ARC FURNACE.

Brit. Steelmaker, 37(8): 20-21, 23-24, Aug. 1971.

The problem of are furnace fume control are outlined in the light of increasing electric steelmaking expansion and stricter anti pollution legislation. At the end of 1970, the British steel industry owned 184 electric arc furnaces in 76 plants. The standard for fume emission is not more than 115 mg/cu m, unless visible fumes are allowed, in which case it is 460 mg/cu m. The low-pressure drop wet scrubber does not meet modern standards, and present choices are between the high pressure drop venturi scrubber, bag filter, and electrical precipitator. The American four row baghouse is not easily applied because it takes up space rarely available in British works. Information was supplied by 60 works using 133 furnaces. A total of 211 furnaces have fume cleaning equipment. Bag filters serve 62 furnaces, venturi scrubbers serve 13 furnaces, a disc scrubber serves one furnace, and 32 furnaces are serviced by electrostatic precipitators of which 16 are wet, 6 are dry, and 10 are of unspecified type. The consensus among operators seems to be that these systems will work only when planned maintenance is adhered to.

22046

APTIC NO. 42005

PUBLIC NUISANCE CONTROL AGREEMENT AND DISASTER PREVENTION PLANS OF CHITA CITY (AICHI PREFECTURE) AND MITSUI INDUSTRIES.

(Aichi-ken Chitashi to Mitsui Bussan to no kogi koshi kyotei narabi ni kosaigai koshi keibakusho). Text in Japanese. Kogyo Ricchi (Ind. Location), 10(11):51-53, Nov. 1971.

The pollution control agreement between Chita municipal government and Mitsui company, which had obtained the south bank of Nagoya city for construction of factories, is discussed. According to the agreement, the company must install suitable facilities for air, waste water, noise, vibration, and odor pollution controls, and the installation plans of the facilities must be approved by the government. The company was also required to test the fuels, materials, products, and wastes periodically and keep the records. In the pollution control plan, it was stated that the heights of stacks for boilers must be more than 80 m, and the sulfur content of fuel must not exceed 1.6% or 1.4% in 1973, and in case the situation worsens, fuel containing less than 0.6% of sulfur must be used. The standards for the waste water are: average PH 6.0 to 8.3; BOD less than 20 ppm; SS less than 50 ppm.

22047

APTIC NO. 42017

BAG FILTERS FOR DUST FREE MATERIAL TRANSPORTATION. (Beutelfilter zur staubfreien Schuettgutfoerderung). Text in German. Wasser Luft Betrieb, 16(6):201, June 1972.

A new bag filter has been developed for dust-free material transportation. Four filters form a unit with a filter surface of 8.2 sq m. Up to a maximum of 12 units can be mounted in parallel having a total filter surface of 98 sq m, measuring 1.3 by 1.8 by 4 m. Up to a dust particle size of 0.4 micron, the efficiency of the filter amounts to 99.97%. The filter material resists temperatures up to 135 C. The filter inlet is situated at the top of the unit and the air stream is pointing downward in order to avoid excessive wear of the bag surface. The air is sucked through the filter in a manner that the dust distributes homogeneously on the whole bag surface. The filtered air leaves the unit through a chamber at the upper end. Dedusting of the filter is effected by several impulses of compressed air of 6 to 7 atm.

22048

APTIC NO. 42065

WASTE GAS CLEANING PROCEDURES UTILIZING WET SCRUBBERS. (Abgasreinigung mit Nasswaesclern). Text in German. Chem. Tech. (Berlin), 1(5):229-230, May 1972.

Centrifugal washers are dynamic low-pressure wet dust arresters with a high separation efficiency of up to 99.88%. The gas cleaning effect is based on the intimate turbulent contact of the dust-laden air with the scrubbing liquid. Each dust particle is thoroughly wetted and weighed down with a droplet which increases its inertia and causes it to be separated by centrifugal force. The core of the centrifugal washer is the whirling chamber, a fixed system of sheet-metal deflectors. The water-air mix is injected at a high velocity into the whirling chamber forming a rinsing roller whose turbulence is enhanced by tangential injection of a secondary air stream through a lateral channel in the chamber. Turbulence is maintained over a wide range of water-air ratios, and fluctuations from 5% to -25% of normal capacity are easily handled. A drip catcher is coupled with the washer at the outlet side. The washer works without jets or a pump; washing is accomplished solely by the gas flow. The water level is regulated by an overflow regulator. The high-pressure venturi scrubber also has no moving parts and all energy is supplied by the gas flow. Dust-laden air is injected tangentially from both sides of the venturi flute at 100 m/sec which induces an intimate turbulent contact between dust particles and whirling water. Even the smallest particles are subsequently separated by impact in the upper part of the scrubber. The sludge runs down to the bottom of the washer where it is removed continually or periodically.

22049

APTIC NO. 42083

Daichi Industries, Ltd. (Japan)

CLEAN AIR. THE PRESENT DAMAGES BY SULFUR DIOXIDE GAS AND AIR PURIFICATION DEVICE BY

ALKALINE FILTER MATERIAL. (Ea kurin. Aryusan gasu ni yoru shogai no jittai to arukari rozai ni yoru kuki seijo sochi). Text in Japanese. 19p., Sept. 1, 1970.

The development of a new air-purification device (Air Clean) is described together with the results of experimental field tests. Preliminary experiment was carried out using unwoven cloth, 10 mm thick and treated with alkali, for the adsorption of eight JIS test particulates at concentrations of 20 ppm and at surface wind velocity of 0.2 m/s. Conductivity measurements showed that sulfur dioxide collection efficiency was almost constant at gas concentrations from near zero to 100 ppm. At higher wind velocity, the efficiency decreased. At 45% relative humidity (RH) or higher, the efficiency remained constant; it decreased significantly at RH 30%. The filtering material had a germicidal effect on bacillus coli and staphylococcus. Device Air Clean P was tested for adsorption of SO₂ and other harmful gases. The SO₂ collection efficiency was plotted against the filter life and the curve was used to estimate the life of the filter. The collection efficiency reached 99% over a certain period of time, then started to decline. Collection efficiencies for other gases were 56% for nitrogen dioxide at wind velocity 0.3 m/s and RH 80%; 52% for carbon dioxide at wind velocity 0.5 m/s; 40% for carbon monoxide at wind velocity 0.2 m/s; and 85% for hydrogen fluoride at 0.5 m/s. Particulate collection efficiency was 45 to 67%. Extended field tests in Nagasaki confirmed the efficiency of the filter. Air Clean models A and F are graphically illustrated.

22050

APTIC NO. 42282

SEARCHING FOR SOLUTIONS TO POLLUTION PROBLEMS. *Eng. Mining J.*, 173(6):178-183, June 1972.

Hydrometallurgical processes have often been suggested as an attractive alternative to the pollution prone smelting techniques. Chalcocite has been treated by acid pressure leaching to yield elemental sulfur and a copper sulfate solution from which the copper may be recovered electrolytically. Nitric acid also has been suggested for reaction with copper sulfides to yield sulfur, and the old technique of using ferric chloride solution to leach copper sulfides is being re-examined. Early in 1971 the eight major copper companies which account for all the U. S. primary copper smelter production announced the formation of a new research association; its objective is the development of improved methods for removing sulfur oxides and particulates from smelter off-gases. Over 100 processes or variations were reviewed by the new organization, the Smelter Control Research Association, before selecting wet limestone scrubbing as a candidate for pilot plant study. The cost to the copper industry of pollution control is cited. The deSeversky Hydro Precipitator process, which involves ammonia injection and a granular bed device, can be used to remove both sulfur dioxide and fly ash simultaneously. The reduction of SO₂ to elemental sulfur, reverberatory smelting modifications, continuous smelting and converting processes, the Monsanto Cat-Ox process, the Wellman-Power Gas SO₂ recovery process, acid mine water treatment, ion exchange removal of mercury, and the combination of pollution control with production of some salable by-product are discussed.

22051

APTIC NO. 42287

Ramag Verfahrenstechnik G.m.b.H. Butzbach (West Germany) REMOVAL OF FLUORINE FROM WASTE GASES. (Entfernen von Fluor aus Abgasen). Text in German. Umwelt (Duesseldorf), 2(3):62-64, June-July 1972. 4 refs.

Aluminum plants emit waste gases containing at times 150/mg/cu m elemental fluorine or fluorine compounds. For each ton of crude aluminum produced, the plants emit 4 kg or more of fluorine. The waste gases of superphosphate plants contain volumetric concentrations between 0.5 and 1.0% silicon tetrafluoride according to some sources even up to 3% gaseous fluorine components. The design and operation of a waste air cleaning plant for a test stand for rocket engines is described. The waste air enters the cleaning system below the

packed layer of a scrubber and passes countercurrent to the scrubbing fluid, an aqueous solution of potassium hydroxide. For removal of the droplets of scrubbing fluid which are carried along by the air another packed layer is arranged ahead of the exit to the stack. The scrubbing fluid enriched with fluorine is recovered, the sludge which accumulates at the recovery is subjected to special treatment for conversion of the fluorine compounds into harmless calcium fluoride. After this treatment it can be dumped.

22052

APTIC NO. 41272

Adolph, H. and D. Jachner

THE CARBON MONOXIDE CONTENT IN THE EXHAUST GASES FROM ENGINES OF THE SKODA-1000 MB PASSENGER CAR. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic. Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlupnymi Gazami Avtomob. Proc. Symp., 2nd, 1971. 3 refs. Translated from Russian. 16p.

The effect of idling speed adjustment on the content of carbon monoxide and the actual content of CO in the engine exhaust gases from Skoda-1000 MB automobiles were investigated. Parameters determined for a hot engine in terms of carburetor adjustment were fuel consumption, air consumption, idling speed rpm, and exhaust CO content. Instruments used were a volume fuel flow meter, rotary gas analyzer, electronic tachometer, and infrared gas analyzer. The uniformity of distribution of the mixture to the cylinders at idling speed, the content of CO and fuel consumption in the positive idling speed mode, and the possibility of reducing the CO content by carburetor adjustment were determined. Optimum results for the test engine were obtained when the angle of opening of the adjustment screw was 4 deg. Results showed that the mixture distribution is not uniform. Carbon monoxide and fuel consumption increase during the positive idling speed mode. A reduction in CO content and in fuel consumption in the idling speed mode can be provided for by adjusting idling speed for small angles of opening of the throttle valve. Carbon monoxide emitted by vehicles checked prior to adjustment exceeded similar indices for new vehicles. Exhaust gas CO from 90 new, mass-produced Skoda automobiles was between 0 and 8.6% by volume. Adjusting the carburetor in 10 of the vehicles reduced the CO to a value not in excess of 3% by volume.

22053

APTIC NO. 41777

Albrecht, E.

ODOR PROBLEMS AT THE COMBUSTION OF WASTE WATER SLUDGES. (Geruchsprobleme bei der Verbrennung von Abwasserschlaemmen). Text in German. Schriftenreihe Ver. Wasser-Boden-Luft/hyg. (Berlin), no. 35:81-84, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Fresh waste water sludge from communal and industrial purification plants spread annoying odors and contain pathogenic germs, parasites, and pollutants so that uncontrolled dumping must be eliminated. Sludge must be aerobically or anaerobically stabilized or thermally treated. In densely populated areas and large chemical complexes, combustion is the most expedient and economical solution. Preference was given in the past to sludge incineration in the story furnace where the sludge and the hot flue gases moved countercurrently. The sludge water evaporated in the upper floors and was carried off with the flue gases without reaching the actual incineration floors. The flue gases must be subjected to treatment for removing the odors. Fluidized bed incineration offers the possibility of burning the unstabilized sludge. A sand layer is suspended by hot combustion air which enters through the nozzles in the combustion chamber floor. In the swirling sand layer, the sludge is dried, crushed, degassed, and ignited. The mechanical effect of the swirling sand grains, the high temperature, and the uniform distribution of the combustion air favor complete combustion at temperatures around 800 C.

22054

APTIC NO. 42280

Allven, Hannes

ENERGY AND ENVIRONMENT. *Bull. At. Sci.*, 28(5):5-7, May 1972.

In the industrialized countries a certain increase in power supply is desirable to the extent that this can be achieved without much insult to the environment. The main argument against the continued burning of fossil fuel is the increased concern about pollution. The price of different kinds of energy is important to the consumer, but it is not equally important for the planning of energy policy. If methods for purifying fuel and cleaning gases exhaust are successfully developed, energy needs can be adequately met with fossil fuels for a period long enough to plan and deploy a sensible world policy for the energy supply and for developing new energy sources. The main new energy sources which sooner or later must take over are fission energy, fusion energy, and solar energy. Waste problems, key issues, and other difficulties associated with these new energy sources are discussed. Whether geothermal energy is abundant enough to be of major importance is not quite clear. The energy problem should not be treated as a series of national problems, but it should be approached as one world problem. The possibility of depoliticizing the world energy problem deserves special attention.

22055

APTIC NO. 41434

Araki, Kunio, Masaki Mikami, and Shigeji Honda

RESEARCH ON BAD ODOR ELIMINATION BY CATALYTIC OXIDATION DECOMPOSITION. (*Sesshoku sanku bunkai ni yoru akushu no jokyō ni kansuru kenkyū*). Text in Japanese. *Hokkaidoritsu kogyo shikenjo Hokoku (Rep. Hokkaido Prefect. Ind. Exp. Stn.)*, no. 185:1-13, March 1972.

Experiments were conducted to study catalytic oxidation-decomposition of offensive odors from a fishmeal manufacturing factory. Equipment with only one tenth of the scale of that used in practical plants was used for this study. The gas treatment capacity was five cu m/min. The equipment chiefly comprised of a dust collector, a washing tower, a condenser, an air pump, and a deodorizing tower which consisted of a heat furnace, a catalytic layer, and a heat exchanger. A mixture of oxides containing approximately 73% silicon dioxide and 14% alumina was used as the catalyst. The offensive odors were analysed as ammonia, volatile amines, hydrogen sulfide, and mercaptans. In a washing liquid/flue gas (L/G) ratio larger than 1.5, the ammonia content in flue gas from the washing tower decreased significantly. At an L/G ratio less than eight, almost no hydrogen sulfide and mercaptans were removed in the washing tower. All the offensive odors were completely removed when the flue gas from the washing tower was introduced into the deodorizing tower at 300 to 350 C.

22056

APTIC NO. 41773

Arsovic, H.

NEUTRALIZATION OF ANNOYING ODORS.

(*Neutralisation belästigender Geruchsquellen*). Text in German. *Schriftenreihe Ver. Wasser- Boden-Luftthyg. (Berlin)*, no. 35:54-63, 1971. (Presented at the Colloquium *Geruchsbelaestigende Stoffe*, Duesseeldorf, West Germany, March 18, 1971.)

In 1967, extensive experiments were carried out with ozone for odor neutralization of waste gases from a paper coating station. The uncleaned gas contained 3.68 g/cu m phenol, 2.82 g/cu m methanol, and traces of formaldehyde. The results were good; 80% of the ethanol acetone was removed; 82% of the iso-propanol; and 80% of toluene. The experiments also showed, however, that for certain hydrocarbons the use of ozone alone is not enough. Ozonization can only be one of several process stages. Ozone can be successfully used if the organic odor reacts with ozone, and if the organic concentration is low and the waste gas volume high. Based on these findings, an odor neutralization plant was built and tested in a

margarine producing plant. Neutralization with more than 60 mg O₃/l removed all odors; carbon dioxide and water formed in the process. 0

22057

APTIC NO. 41543

Baba, Yoshio and Mutsuhiro Fujita

THE PRESENT CONDITION OF BAD ODOR PUBLIC NUISANCE AND PREVENTIVE MEASURES. (*Akushu kogai no genjo to boshi taisaku*). Text in Japanese. *Kagaku kojo (Chem. Factory)*, 16(5):10-21, May 1972.

About 500 factories throughout the country were investigated for the discharge and control of odors. The amount of discharge, the location, and the components of the odorous compounds were studied. It was found that almost none of the factories knew the amount of odor discharged or the actual components of the odors. However, it was known that the odors were discharged from manufacturing processes. The methods of odor control used by different companies are listed. The Flue gas washing method is the most popular way. This is believed to be due its low cost compared with that of other methods. It was also found that in some cases there were odors which could not be removed by water or by the chemicals that were used by the factories. Very few factories are using the combustion method which is considered to be the best method for odor removal from flue gas.

22058

APTIC NO. 42301

Bailey, Ferrall W.

GAS SAVING AND ANTI-POLLUTION DEVICE. (*As-signee not given.*) U. S. Pat. 3,656,462. 4p., April 18, 1972. 15 refs. (*Appl. Oct. 7, 1970, 3 claims*).

A gas mileage booster and pollution control device for internal combustion engines are described. This multi-purpose device increases the horsepower of the engine, saves on the wear of the spark plugs, cools the oil in the motor, cuts the amount of carbon in the carburetor, involves no working parts to worry about with respect to wear or breakage, and is not adversely affected by the air conditioning unit in the vehicle or aircraft. The device comprises a hot air passageway from the exhaust manifold, an adjustable cold air passageway from the vehicle interior, a T connection for mixing the cold and hot air of both passageways, and a passageway connected to the air cleaner of a carburetor for bringing in the air mixture. (Author abstract modified) 0

22059

APTIC NO. 41042

Balanov, V. G., R. I. Davidzon, and V. F. Kossovskiy

VENTILATION OPERATION IN DRY EXTINGUISHING COKE PLANTS. (*Rabota ventilyatsionnykh ustanovok USTK*). Text in Russian. *Koks i Khim.*, no. 3:50-51, 1972.

Improvements in air pollution control techniques at a USSR coke plant are described. Both carbon monoxide and dust concentrations were high when exhaust fans with cyclones were applied, and the air ducts and cyclones were damaged by dust and sulfur compounds, respectively. Therefore the exhaust fan was replaced by a blower, and a scrubber with lined plate, using diabase solution, was found to be the most reliable cleaning equipment. The scrubber, with an efficiency of 90%, had a life expectancy of 5-6 years. The air duct following the scrubber required systematic cleaning weekly, but rubberizing the ducts extended their life. Sectional exhaust fans with dry cyclones should be designed for new coke feed conveyors.

22060

APTIC NO. 40961

Barth, Walter J.

COATINGS FOR AUTOMOTIVE EXHAUST GAS FACTORS. (*Du Pont de Nemours (E. I.) and Co., Wilmington, Del.*) U. S. Pat. 3,640,755. 5p., Feb. 8, 1972. 9 refs. (*Appl. Feb. 13, 1969, 7 claims*).

A process is described for producing sheet metal substrates having high corrosion and erosion resistance to hot exhaust gases of internal combustion engines. Since exhaust manifold reactors operate over a wide temperature range, common metals of construction tend to fail early in exhaust reactor structures. The special process of this invention consists of melt spraying the most critical interior areas of a reactor core with a mixture of 70-90% by weight of nickel and 10-30% by weight of aluminum to a coating thickness of 125-250 microns and then diffusion coating that coating with an aluminum layer at least 25 micron thick.

22061

APTIC NO. 41592

Baylis, R. L.

NON-AQUEOUS DISPERSION FINISHES-INDUSTRIAL ORGANIC FINISHES WITH REDUCED POLLUTION LEVEL. *Trans. Inst. Metal Finish., 50(Part 2): 80-86, 1972.*

The majority of industrial finishes now in use are based on aromatic solvents, which are recognized as potential sources of pollution. The substitution of non-aqueous dispersions, especially aliphatic hydrocarbons, can reduce air pollution and improve processing. Both thermoplastic and thermosetting finishes have been developed with process characteristics similar to conventional finishes. Using aliphatic solvents, the atomized paint particles arrive at the surface in a high solids state. This gives the capability for high build with freedom from sags and runs. The baking schedules for solution and NAD are identical. Under air pollution solvent restrictions expected to come into force in 1974, paint formulators will be faced with limitations on the type and amount of solvent to be used. The NAD finishes fill the legislative requirements and can readily be used in existing processes.

22062

APTIC NO. 41072

Beck, Robert

CALCULATION OF PACKED COLUMNS. (*Berechnung von Füllkörperpackungen*). Text in German. *Chem. Ing. Tech., 44(8): 596-598, April 1972, 3 refs. (Presented at the Erfahrungsbogen-Ingenieur, Nürnberg, West Germany, Sept. 1-23, 1971.)*

On the basis of the results of 115 distillation experiments and 48 experiments with an air/water system, empirical relationships for the maximum admissible gas velocity, the pressure loss, and the optimum packing height in packed columns were derived. In order to correlate the various measurement values, the actual gas velocity between the layers of packing material as a function of the ratio of the packing material diameter to the column diameter had to be determined. The validity of the equations was tested on packed columns with column diameters between 150 and 1200 mm and packing material diameters of 8 to 80 mm.

22063

APTIC NO. 41122

Behrens, D.

TOWARDS A TECHNOLOGY WHICH DOES NOT ENDANGER THE ENVIRONMENT. (*Auf dem Wege zur umweltfreundlichen Technik*). Text in German. *Chem. Ind. (Duesseldorf), 24(5):283-287, May 1972.*

On the initiative of the Federal Ministry for Education and Science, a study group investigated the most important industrial environmental pollutants. In 1970, the sulfur dioxide emissions were about 3.5 million tons; carbon monoxide, about 4.7 million tons; and nitric oxide, 1.5 million tons. Two methods can be applied to reduce the SO₂ emissions: the desulfurization of flue gases, and the desulfurization of fuels. Both methods have not yet been submitted to large-scale tests. Costs for flue gas desulfurization are estimated to amount to \$10/kwh while fuel desulfurization will cost \$5.00 to \$7.50/ton fuel. Bad odors usually consist in sulfur or nitrogen compounds; these can be removed either by thermal or catalytic

post-combustion (critical due to the high energy demand), or by absorption, a method which is problematic because of loss of pressure, cooling of the gas, and the low absorption velocity.

22064

APTIC NO. 42025

Bender, Rene J.

AIR POLLUTION CONTROL: ITS DUAL EFFECT ON THE CHEMICAL INDUSTRY. *Power, 116(7):44-47, July 1972.*

The chemical industry, in which are included the organic chemistry, petrochemical, and petroleum industries, has developed new technology in many areas to meet the demands of a cleaner environment. Recent developments have made the conventional flares unobtrusive and inoffensive. One of the most difficult problems facing the petrochemical industry is that caused by inadvertent leakage of hydrocarbons in the processing units where products are handled. The need for a more effective, heat-resistant, longer-life bag filter in the many applications where scrubbers or other dust collectors are not satisfactory led to the development of new high-temperature fibers. In the field of paints, coating, and enamels, techniques have been developed to limit the emissions of certain organic solvent vapors into the atmosphere. These include the use of water-reducible acrylic enameling, the liquid electrodeposition process, and an approach involving a powder deposited electrothermally on the preheated parts, either in a fluidized bed or by electrostatic spray. The replacement of conventional wood pulp trays with styrene foam trays in the meat packing industry may reduce by one half the objectionable effect of trays on the environment. Environmental pollution control personnel positions in the DuPont, Standard Oil (N. J.), and Union Carbide organizations are described. Between 1966 and 1970, the petroleum industry spent over \$2 billion on pollution control. By 1972 the chemical industry had spent a total of \$587 million on air pollution control, \$700 million on water pollution, and \$83 million on solid waste handling.

22065

APTIC NO. 42126

Benson, Homer E.

SEPARATION OF CARBON DIOXIDE AND HYDROGEN SULFIDE FROM GAS MIXTURES. (*Assignee not given.*) *U. S. Pat. 3,642,430, 7p., Feb. 15, 1972, 4 refs. (Appl. Sept. 19, 1969, 6 claims).*

A new method was found for treating gas mixtures containing high partial pressures of carbon dioxide and/or hydrogen sulfide which permits the use of absorber columns of markedly reduced cross sectional area, thus making it practicable to treat large streams of such mixtures in a single train rather than in two or more parallel trains. The gas mixture is contacted with the scrubbing solution in an absorption stage maintained under substantial superatmospheric pressure and containing at least two absorption zones. Each absorption zone is separately supplied with approximately equal, separate streams of regenerated scrubbing solution, and separate streams of spent scrubbing solution are withdrawn from the bottom of each absorption zone. The gas mixtures to be purified pass successively through the separate absorption zones with approximately equal quantities of acid gas being absorbed in each zone. The scrubbing solution is regenerated at reduced pressure and recycled to the absorption zone. (Author abstract modified)

22066

APTIC NO. 41771

Bernert, J.

SOURCES OF ANNOYING ODORS AND MEASURES FOR COMBATING ODORS. (*Belaestigende Geruchsquellen und Massnahmen zu ihrer Bekämpfung*). Text in German. *Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no. 35:41-51, 1971. (Presented at the Colloquium Geruchsbelästigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)*

Odor elimination in the following branches of the food industry was examined: meat smoking stations, malt production stations, beer breweries, stations producing seasonings, meat canning industries, poultry and pig breeding stations, and pommes-frites-frying stations. The meat smoking station was equipped with a thermal afterburner. The waste gas which entered the afterburner with a concentration of more than 400 mg C/cu m left it with less than 100 mg C/cu m. The gases leaving the afterburner were not visible. A roasting drum for malt production with a capacity of 1000 kg malt/charge was equipped with a cyclone retaining solid matter, such as husks, and an afterburner of the same type as used in the meat smoking plant. Sixteen measurements were taken at various operating stages. Nine yielded an afterburner efficiency between 88.2 and 97%. In a beer brewery, the operations of a condenser and pressure drop separator for odor elimination were examined. A temperature drop of 3.8 C (88.8 C in front of and 85.0 C behind the condenser) lead to the removal of 32.5% of condensate and of 36.5% C. It can be assumed that at higher temperature drops, higher efficiencies can be achieved. In the production of seasonings, a strong odor develops through dissociating proteins. This odor was removed by a bio-filter with an efficiency of up to 75.7%. In a meat canning plant the performance of an air filter was examined. Its real efficiency could not be determined. Measurements prior to and after filtration yielded an efficiency between 8.8 and 31%. Difference weighing yielded an efficiency of 80.4%. An ozonizer installed in poultry and pig breeding stations proved too inefficient. In a pommes-frite frying station, the efficiency of a pressure drop separator is presently being examined.

22067

APTIC NO. 41522

Best, W. H.

INCINERATION: STATE OF THE ART. *Ind. Gas*, 52(5):15-18, May 1972.

Natural gas-fired incinerators are an effective tool for controlling many potential pollutants. Gaseous and fine particulate hydrocarbons can often be incinerated by raising their temperature above the auto-ignition point. The amount of contaminant must be small, and the volume of inert carrier must be large. For paint curing ovens, 10,000 cu ft of air must be used for each gallon of solvent. Direct flame incineration can be used for those gases having heating values as low as 100 Btu/cu ft; many gases with lower heating values can sustain combustion when preheated to 700 F. Thermal incineration is an excellent alternative for wastes with very low heating values. Temperature and dwell time can be adjusted to provide complete oxidation. Liquid incineration is often possible. Through atomization, organic compounds with water can be incinerated; usually a secondary combustion chamber is required. In some instances, multiple treatment may be necessary to remove toxic material either created in the combustion process or not consumed by it. Fume incineration without heat recovery is a waste of energy. A well designed counterflow heat exchanger, though initially expensive, can reduce the cost of operation by as much as 70% by preheating the waste gases. Where the recovered heat can be used elsewhere, the cost of operation can be cut even further.

22068

APTIC NO. 41587

Bielawski, Christian

TOXIC AGENT SEPARATOR ARRANGEMENT FOR INTERNAL COMBUSTION ENGINE EXHAUST GASES. (*Vorrichtung zum Ausscheiden von Giftstoffen aus den Abgasen von Brennkraftmaschinen*). Text in German. (*Kaeltechnik G.m.b.H., Trier (West Germany)*) W. Ger. Pat. Appl. 1,953,377. 3p., Oct. 23, 1969. 8 refs. (5 claims).

This comprises, connected to the engine outlet, a pre-cooler, a sprinkler operated washing arrangement, a drying-cooler arrangement with associated sprinklers in which the gas is cooled to 0 C, and connected to this a deep freeze arrangement with chemical filter in which the gas is cooled to 10 C. A kieselgur filter is filled between the pre-cooler and the washing

arrangement and a catalytic afterburner may be arranged on the engine outlet.

22069

APTIC NO. 41210

Bleyz, N. G., N. D. Derbaremdiker, Ye. S. Kartashov, Yu. N. Lashin, B. M. Mikheliev, and V. T. Panfilov

THE USE OF THE VACUUM LIMITER TO REDUCE THE TOXICITY OF VEHICULAR EXHAUST GASES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukh Gorodakh Vyhlopnymi Gazami Avtomob., Proc. Symp., 2nd, 1971. 3 refs. Translated from Russian. 12p.*

A reduction in the toxicity of automotive exhaust gases was achieved by using a vacuum limiter to open the access for air in the intake manifold of the engine in the positive idling speed mode. The effectiveness of the vacuum limiter is determined by the complete cessation or significant reduction in the emission of carbon monoxide, aldehydes, and carcinogens. Lubricating oil consumption and carbon formation were reduced and knocking in the silencer was eliminated. Cessation of the combustion processes at positive idling speed when the vacuum limiter is functioning results in a relative increase in the emission of hydrocarbons, but this can be prevented by the combined use of a vacuum limiter and idling speed economizer. The installation of the economizers tested outside the carburetor idling system had no effect on that system's dependability or speed of action and provided for complete fuel delivery shut-down from the carburetor upon a command pulse from the vacuum limiter.

22070

APTIC NO. 42190

Blotskiy, S. N., V. M. Pomazuyev, Ye. S. Golikov, A. S. Galkin, and V. G. Pidorchenko

EXPERIENCE IN THE USE OF GAS-CLEANING FACILITIES ON ELECTRIC FURNACES. (*Opyt ekspluatatsii gazoочистnykh sooruzheniy za elektropetcham*). Text in Russian. *Stal*, vol 1:88-91, 1971.

Experiences gained in connection with the use of wet type venturi scrubbers (height 1.3 m, diameter 3.3 m) on electric furnaces at a metallurgical plant are described. The waste gas to which air is added for oxidizing the carbon monoxide and reducing the temperature, is put through the scrubber at a rate adjustable from 3000 to 40,000 cu m/hr. The dust concentration is reduced from 1-10 g/cu m (with a fraction below 5 micron of up to 80%) to 20-80 mg/cu m, corresponding to an efficiency of 40-60%, with a water consumption of about 70 cu m/hr. Special water nozzles sharply reduced the sludge deposits in both venturi tubes and scrubbers. The replacement of 20 venturi tubes with 90 mm diameter by three tubes with extended throat and 270 mm diameter resulted in 30-40% increase in the throughput capacity without affecting the efficiency. The hydraulic resistance of the venturi tubes lies at 1000-1,1000 mm water column. While no corrosion has yet occurred due to the relatively high basicity of the spray water, its high sludge concentration (0.152 g/l before and 0.532 g/l after the scrubber) causes pluggings of the water and sludge pipes.

22071

APTIC NO. 42155

Bogan, Simeon

COMBUSTION CONTROLLING ANTI-POLLUTION DEVICE. (Assignee not given.) U. S. Pat. 3,653,364. 5p., April 4, 1972. 7 refs. (Appl. Oct. 27, 1970, 6 claims).

A device is described for producing hydrogen gas and introducing it into the intake manifold of an internal combustion engine. The device is in the form of a container having several iron balls within it and an electric heating device. The anti-pollution device has a heat exchange relation with the exhaust pipe so that the iron filings, and consequently the steam vapor introduced into the container, may be heated by the electric heater and the heat from the exhaust pipe. This assures a

supply of hydrogen gas to the intake manifold even though the heat produced by the exhaust pipe is inadequate for this purpose. The device is adequately controlled and provided with safeguards to assure that the engine will operate properly.

22072

APTIC NO. 41726

Boudet, Rene

LNG S PROSPECTS IN WORLD MARKETS. *World Petrol.*, 42(12):22-24, 26-27, Dec. 1971.

Liquid natural gas (LNG) supplied 20% of the world's energy in 1970 and should produce 25% by 1975. Sea transportation requires high pressure and low temperature; suitable vessels are available. Consumption of gas in the U. S. has exceeded quantities discovered since 1968. Liquefied natural gas shipments of 16,000 million cu m to the east coast and 5000 million cu m, to the west coast are possible, increasing to 40,000 million cu m and 8000 to 10,000 million cu m, respectively, by 1981. Gasification of coal is commercially feasible by 1975. Japan is the largest importer of energy, but costs of transportation are high; Russian natural gas is closer than Western sources. Opportunities for LNG in Japan could double between 1975 and 1980, with best opportunities after 1980. Large European reserves exist, particularly in Holland. An international network of gas pipelines is expected in Europe within 10 years. A total fleet capacity of 1,036,000 cu m to transport 15,500 million cu m/yr over an average distance of 1400 miles is expected by 1975. France predominates in the sea transport of LNG but Japanese interest is increasing.

22073

APTIC NO. 42135

Bourne, Ronald F

DUST COLLECTORS. (Asbestos Grading Equipment Co. Ltd., Johannesburg (South Africa)) U. S. Pat. 3,648,442. Sp., March 14, 1972. 4 refs. (Appl. May 20, 1970, 8 claims).

An air filter is described in which dust laden air is passed through several filtering bags and from which trapped dust is dislodged by reversing the air flow through the bag walls sequentially. The trapped dust which falls under the influence of gravity onto the floor of the filter is swept towards an exhaust port and suitably discharged. The air filter unit comprises a casing which defines a chamber, a floor, a dividing wall or ceiling, a reservoir zone, a central rotatable shaft, a series of dust trapping bags, a floor sweeping mechanism, another shaft, and a blower unit. (Author abstract modified) 0

22074

APTIC NO. 42064

Brand, Hans-Dieter

THERMAL AND CATALYTIC WASTE GAS CLEANING INCLUDING THE WET NITROGEN OXIDE PROCEDURES. (Thermische und katalytische Abluftreinigung einschliesslich der nassen Beseitigung von Stickoxiden). Text in German. *Chem. Tech. (Berlin)*, 1(5):224-225, May 1972.

Toxic or malodorous pollutants, mainly hydrocarbons, can be removed by thermal combustion at around 750 C. or by catalytic combustion at below 400 C. Nitrogen oxides are reduced by scrubbing with subsequent combustion products in a reducing atmosphere. Thermal installations use root burners or space burners, with the latter requiring dust-free waste gas with an oxygen content of at least 16%. Catalytic combustion can be applied only with gases free of catalyst poisons, such as organic phosphorus compounds, silicones, and organic salts of heavy metals. Platinum, palladium, and rhodium salts applied to a ceramic carrier serve as catalysts. Honeycomb-shaped catalytic elements are used to advantage in the case of dust-laden waste gases. Large installations for catalytic combustion can process 30,000 cu m waste gas/hr with conversion efficiency exceeding 95%. Waste gases from some processes contain such high hydrocarbon concentrations that the combustion heat is used for steam production. Catalytic and ther-

mal combustion can also be applied to purify hydrocarbon-polluted effluents which are first stripped with air which is subsequently burned; this process is often cheaper than biological purification. Waste gases from the manufacture of silver nitrate, from thermal decomposition of nitrates, from the oxidation of organic compounds with nitric acid, and from the pickling of copper, rich in nitrogen oxides, are converted back to nitric acid in a battery of scrubbers where the gases are scrubbed with water. Hydrogen peroxide is added to the last scrubber or to the waste gas from it. A residual concentration of under 200-300 ppm nitrogen oxides is burned in a thermal combustion chamber in 6 reducing atmosphere where reduction to nitrogen takes place.

22075

APTIC NO. 41633

Branquet, L.

THE INCINERATOR OF THE CITY OF RENNES/France-CONSTRUCTION AND OPERATION. *Mitt. Grosskesselbetr.*, 52(2):146-148, April, 1972. (Presented at the VGB-Fachtagung, Muellverbrennung 1971, Essen, Heilbronn, and Braunschweig, West Germany, Sept. 3, Sept. 16, Oct. 1, 1971, respectively.)

The incinerator of the city of Rennes in France has been designed for a refuse throughput of 240 tons/day with a heating value of 1100 to 2500 kcal/kg. It comprises two units each equipped with a grate of 20 sq m and a steam boiler with 27 kg/sq cm steam pressure. The refuse is collected in a bunker where a slight underpressure is maintained. The heat from the combustion gases is used for steam production. The flue gases coming from the boilers are cleaned in electrostatic precipitators to a residual dust concentration of 0.2 g/cu m. The uncleaned gases carry a dust concentration ranging from 11 to 17 g/cu m. The collection efficiency of the precipitators is more than 97%. The plant was taken into operation in Aug. 1968. It has operated ever since quite satisfactorily. The total operating costs amount to 3 dollars/ton of refuse. Presently, 18,000 tons of slag accumulate per year which the city plans to process for use in road construction.

22076

APTIC NO. 40958

Brink, David L. and Jerome F. Thomas

METHOD AND APPARATUS FOR PREVENTING FORMATION OF ATMOSPHERIC POLLUTANTS IN THE COMBUSTION OF ORGANIC MATERIAL. (California Univ., Berkeley) U. S. Pat. 3,639,111 6p., Feb. 1, 1972. 11 refs. (Appl. Jan. 30, 1969, 12 claims).

Organic material, such as kraft black liquor, organic fuels, garbage, and organic wastes, can be destructively distilled and pyrolyzed at an elevated temperature, for a time sufficient to break down the material to noncombustible solids and to a stable gaseous clean burning fuel. The temperature is maintained to preclude recombination of intermediate products formed during the pyrolysis and which would otherwise pollute the atmosphere. A controlled amount of oxygen is continuously introduced during the cracking to provide energy by exothermic oxidative reactions but the oxygen is insufficient to effect stoichiometric (complete) combustion. (Author abstract modified)

22077

APTIC NO. 42067

Brooking, H. I. and D. C. Walton

THE SPECIFICATION OF MOLECULAR SIEVE ADSORPTION SYSTEMS. *Chem. Eng.*, no. 257:13-18, Jan. 1972. 5 refs. (Presented at the Institution of Chemical Engineers Symposium, Midlands Branch, England, Sept. 29, 1971.)

Recent advances in co-adsorption methods, and the fact that molecular sieves can now be custom built for specific applications, ensures that there will be a steady growth in the use of this separation method. Properties of the four main types of molecular sieves are summarized. The specific pore size of

these adsorbents, together with the fact that at least the 3A, 4A, and 5A materials have pores with diameters approximately equal to the critical diameters of many simple molecules, is the origin of the name molecular sieve. The adsorptive surface of molecular sieves is highly polar and the more polar molecules are adsorbed more strongly. Besides affecting the size of a molecular sieve bed, the feedstock composition can drastically affect the life of the adsorbent. Basically, there are two ways in which adsorbent life can be affected: by the deposition of foreign matter in the adsorbent pores, thus preventing the adsorbate from gaining entrance to the adsorption sites, and by chemical attack of the adsorbent particle or surface. The importance of adsorption regeneration is also considered, including common regeneration systems and variables affecting the efficiency of regeneration. Operating time, molecular sieve bed life, and loss of fluid pressure are other important factors in molecular sieve bed design.

22078

APTIC NO. 41437

Bubenicek, Milan

NEW TYPE OF MIXING CONDENSER FOR CONDENSATION OF WASTE VAPOR IN THE CHEMICAL INDUSTRY. (*Nový typ směšovacího kondenzátoru ke kondenzaci brydových par v chemickém průmyslu.*) Text in Czech. *Chem. Průmysl (Prague)*, 22(2):85-87, 1972. 3 refs.

A surface condenser for waste vapors from concentrated citric acid solutions was replaced with a mixing film condenser with a vertical counter-flow arrangement. The supporting boards were placed inside of the cylindrical coat and sprayed with cooling water to prevent contact between the vapors and the metallic surface. The coolant circulated in an open circuit and the absorbed air was released after throttling to condensation pressure. The advantages of the film condenser are complete elimination of corrosion, lower weight, and an increase of the volume coefficient of heat transfer from 18,000-35,000 to 290,000 W/cu m deg.

22079

APTIC NO. 41130

Buchwald, Karl-Heinz, Guenter Kleinschmidt, Uwe Langer, and Erhard Doehler

REMOVAL OF HYDROCARBONS FROM REFORMED GASOLINE. (*Verfahren zur Gewinnung von reinen Kohlenwasserstoffen.*) Text in German. (*VEB Petrochemisches Kombinat Schwedt (East Germany)*) W. Ger. Pat. Appl. 2,114,970. 7p., March 27, 1971. 4 refs. (3 claims)

Benzene, toluene, and xylene, were separated from reformed gasoline by extraction at high selectivity and capacity with a mixture (four fold amount) consisting of N-methylcaprolactam at 44%, ethylene glycol at 45%, and epsilon-caprolactam at 11%. They were extracted at selectivity 8.9, 6.3, and 5.9, respectively from gasoline containing 13.7%, 7.1%, and 35.7% of the substances. With a solution consisting of 55% N-methylcaprolactam and 45% epsilon-caprolactam, the benzene, toluene, and xylene were extracted with selectivity 5.5, 3.7, and 3.1, respectively

22080

APTIC NO. 41918

Campbell, Ivan D.

PROCESS FOR CONTROLLING THE BURNING OF SULFUR. (*Georgia-Pacific Corp., Portland, Oreg.*) U. S. Pat. 3,644,092. 4p., Feb. 22, 1972. 5 refs. (Appl. Dec. 22, 1969, 8 claims).

A sulfur burner assembly is presented which is equipped with an ultraviolet sensor to control the oxidizing conditions of the sulfur combustion. Control is accomplished by determining the ultraviolet radiation of the flame and regulating the combustion conditions to obtain a given amount of ultraviolet radiation in the combustion gases at a particular control point. By controlling sulfur oxidation utilizing the magnitude of the flame obtained in the combustion gases, any changes in the

oxidizing conditions can be readily detected, and the ratio of sulfur to oxygen or air being passed to the burner and the combustion chamber can be quickly adjusted to obtain the desired degree of oxidation or burning.

22081

APTIC NO. 42165

Castelet, G. de

THE POSITION TAKEN BY RENAULT. (*La position de Renault.*) Text in French. *Pollut. Atmos. (Paris)*, 14(54):166-168, April-June 1972

The contribution by Renault to exhaust emission control is reviewed. European and U. S. emission standards are compared. European standards are expected to become stricter in 1974-1975. Prototypes of cars intended for sale in the U. S. are tested there regarding exhaust emissions. Different emission control measures envisaged for 1976 car models in the U. S. (air injection to the exhaust gas as well as catalytic afterburners for carbon monoxide, hydrocarbon and nitrogen oxides removal) are expected to cause a rise of about \$350 in the purchase price. Both tests and research are conducted in close cooperation with Peugeot. Modifications introduced during the last years have affected carburetor and idling adjustments, valve controls, and ignition timing, while the clearance between cylinder wall and piston has been reduced. Over \$2 million will be spent by Renault on emission control research in 1972, and 1973.

22082

APTIC NO. 41111

Chaput, H.

URBAN TRANSPORTATION AND EMISSIONS. Preprint, Society of Automotive Engineers, Inc., New York, 14p., 1971. 8 refs. (Presented at the Society of Automotive Engineers, International Mid-Year Meeting, Montreal, Canada, June 7-11, 1971. Paper 710559.)

Techniques and other significant factors are described to satisfy good maintenance consistent with the control and abatement of diesel bus exhaust emissions in urban transit operations. Major stress is placed on the use of instruments, not only for inspection, diagnosing, and correcting obvious faults which cause black and blue smoke, but also for monitoring engine deterioration and indicating when motor and torque oil should be changed. Engine wear is cited as the major enemy to both engine life and control of less obvious yet more troublesome emissions, and fuel dilution and dirty engine conditions as major causes of wear. The use of new devices to reduce fumes and an approach to engine and component replacement for an optimum balance between long life and good performance are described. (Author abstract modified)

22083

APTIC NO. 41950

Choura, Vaclav, Herbert Ruecker, and Frantisek Chlumsky

AUTOMATICALLY CONTROLLED OPERATIONAL UNIT FOR DESULFURIZATION OF END GASES FROM THE MANUFACTURE OF SULFURIC ACID.

(*Automaticky regulovaná provozní jednotka adsorbování koncových plynů z výroby kyseliny sírové*) Text in Czech. *Chem. Průmysl (Prague)*, 21(12): 609-612, 1971. 6 refs.

The technology of a unit for ammoniacal desulfurization of end gases from the manufacture of sulfuric acid with subsequent decomposition of the absorption solution by nitric acid to ammonium sulfate and nitrate, is examined. The end gases enter the bottom of two absorption towers lined with polyvinyl chloride connected in series in a volume of 40,000 cu m/h where they are countercurrently sprayed by an ammoniacal solution of ammonium sulfite, hydrosulfite, and sulfate which absorbs the sulfur oxides. The absorption solution is purged into a reservoir whence it reaches the decomposition column and is mixed with nitric acid and runs over Raschig rings into a steam-heated boiler where the sulfur dioxide is desorbed, dried, and returned to sulfuric acid manufacture. The residual

solution contains ammonium nitrate and sulfate which are further processed to a fertilizer. The SO₂ concentration prior to desulfurization and of the end gases from this process is measured by conductometric analyzers within limits of 0.1% and 0.01% SO₂. The working effectiveness of the system is dependent on the strict adherence to optimal technological conditions, i.e., on optimal ammoniacalization of the absorption solution which is being regulated by the automatic conductometric determination of SO₂ tension above the absorption solution which is proportional to its composition. The signals are transmitted to a regulator governing the supply of ammoniacal water. The concentration of the absorption solution is kept constant before it reaches the decomposition column by continuous measurement of its density and by automatic control of the inflow of diluting water when necessary. Optimal working parameters for the various phases of the process are given.

22084

APTIC NO. 42161

Clavel, M.

THE POSITION TAKEN BY CITROEN. (*La position de Citroen*). Text in French. Pollut. Atmos. (Paris), 14(54):163-165, April-June 1972.

The attitude of Citroen towards problems of automotive emission are outlined. As the maximum amount of exhaust is generated within an idle speed range of 800-1200 rpm, smooth, congestion-free traffic should be secured. Crankcase gas recycling has been required since 1963, and the maximum allowable carbon monoxide emission at idle was lowered from 8% to 4.5% in 1969. New CO and hydrocarbon emission standards, as specified by the European cycle, will be imposed in 1972. Further reductions of 20% and 10% in the CO and hydrocarbon emissions will be required in 1974. Recent research conducted by Citroen is centered on such problems as cylinder-head geometry, turbulence, carburetion and ignition, electronic ignition control, air injection to exhaust, exhaust afterburning, ignition and combustion processes in very lean mixtures, as well as fuel cell-powered vehicles for urban traffic. Electronic ignition timing, being relatively expensive, cannot be applied to all car models. Data from exhaust analyses are processed by means of computer.

22085

APTIC NO. 41603

Clement, J. L. and J. S. Elliott

NEW DESIGN FOR A KRAFT RECOVERY BOILER FOR THE ELIMINATION OF ODOR. (*Un nuevo diseño de caldera de recuperación kraft elimina el olor desagradable*). Text in Spanish. Dyna (Madrid), 46(7):339-343, July 1971. 4 refs.

The new Kraft recovery boiler designed by Babcock and Wilcox, which lacks the direct contact evaporator which constitutes the chief odor emission source, provides complete combustion of the black liquor and prevents hydrogen sulfide and organic sulfur derivative emissions. Complete combustion of the latter occurs in the upper portion of the furnace by means of intensive air supply at the second and third air inlets. An enlarged heat transfer surface provides the cooling of the emissions leaving the stack. The new Kraft recovery furnace emits combustion gases containing less than 1 ppm of H₂S and sulfur dioxide as the main sulfur containing pollutant. Included is a graph indicating that minimum SO₂ levels in the stack gas which can be achieved when the sodium/sulfur ratio in the black liquor is above 3.6. Stack height and further developments in the SO₂ absorption equipment of the furnace will provide other means to control the emissions of SO₂.

22086

APTIC NO. 42192

Cole, Edward N.

GAS TURBINE CATALYTIC EXHAUST SYSTEM. (*General Motors Corp., Detroit, Mich.*) U. S. Pat. 3,641,763. 4p., Feb. 15, 1972. 6 refs. (Appl. Sept. 8, 1970. 3 claims).

Since gas turbine engine operation is particularly sensitive to gas pressures, temperatures, and exhaust back pressures, exhaust gas treatment apparatus such as catalytic converters which are positioned outside of the engine are not practical for use with gas turbine engines. A method is provided for the catalytic treatment of exhaust gases from gas turbine engines in combination with the regenerator portion of the engine, thereby providing a reliable and relatively low cost method of treating turbine engine exhaust gases without increasing the back pressure in the exhaust stream or otherwise adversely affecting engine operation. This is accomplished by impregnating or coating the surface of the matrix portion of a gas turbine rotary regenerator with a catalytic material, whereby the exhaust gases are catalytically treated. The heat of reaction is absorbed by the matrix. The matrix is formed of a thin walled ceramic honeycomb of bonded layers of alternate flat and corrugated ceramic sheet members which serve as a carrier for the catalytic material.

22087

APTIC NO. 42132

Cotton, D. H., N. J. Friswell, and D. R. Jenkins

THE SUPPRESSION OF SOOT EMISSION FROM FLAMES BY METAL ADDITIVES. Combustion Flame, vol. 17:87-98, 1971. 18 refs.

A propane diffusion flame was used to examine the mechanism of soot removal by metallic additives. Forty metals were studied, and their efficiencies of soot removal in this flame are given. A semi-quantitative mechanism is proposed for the alkaline earth metals; its basis is that these metals undergo a homogeneous, gas-phase reaction with flame gases to produce hydroxyl radicals which rapidly remove soot or soot precursors. The mechanism is supported by measurements of free radical recombination catalysis by the alkaline earths in premixed hydrogen-oxygen-nitrogen flames. Soot removal by most other metals studied is thought to occur by different mechanisms, and possible ones are discussed qualitatively. (Author abstract modified)

22088

APTIC NO. ----

Culp, Harold G. and Richard R. Tracy

EXPAND NATURAL GASES TO REMOVE N₂. Hydrocarbon Process, 50(10): 89, Oct. 1971.

High concentrations of nitrogen can be removed economically from natural gases by expansion cooling. Raw gas containing 60.7% nitrogen, 39% methane, and 0.3% ethane is regulated to approximately 1500 psi, scrubbed to remove any free water, and fed to a two tower molecular sieve dryer which is automatically cycled to reduce the dew point to below -100 F. The dried gas is fed to the nitrogen removal unit where it is cooled from ambient temperature to -255 to -270 F by exchange with the nitrogen off-gas and methane product. The cooled feed is then expanded through an expansion valve and separated in the first stage separator. The normal separation temperature is about -286 F. An installed system with a capacity of 12 MMcf/d raw gas costs about \$350,000. 0

22089

APTIC NO. 42163

d Ornhjelm, Erik

THE AUTOMOBILE BUILDER'S POINT OF VIEW. (*Le point de vue des constructeurs d'automobiles*). Text in French. Pollut. Atmos. (Paris), 14(54):152-154, April-June 1972.

The attitude of the automobile industry towards problems of exhaust emissions and pollution control is outlined. While the advantages involved in motoring are undeniable, the related problems should be solved in a joint effort of automobile industry, administration, and consumers. Exhaust emission standards should be based on scientific studies, in considering technical, physiological, psychological, economical, and social factors, rather than on subjective impressions. The automobile industry, fully aware of its responsibility, has carried out research in areas such as improvements on gasoline engines

(air injection to the exhaust, crankcase gas recycling, elimination of evaporative losses, idle conditions) and development of new, particularly electric, engines. Such electric engines, powered by battery or fuel cells, should be intended for use in city traffic. The carbon monoxide and hydrocarbon emissions have been reduced by about 20% for the past ten years, and further reduction of 40% will be reached this year. Additional reductions of 20% and 20% for hydrocarbons and CO, respectively, are envisaged for 1974.

22090

APTIC NO. 42101

Dague, Richard R.

FUNDAMENTALS OF ODOR CONTROL. *J. Water Pollution Control Federation*, 44(4):583-594, April 1972. 39 refs. (Presented at the Annual Great Plains Wastewater Design Conference, 15th, Omaha, Nebr., March 23, 1971.)

Developments in the odor control of waste water have indicated that many of the difficulties can be anticipated and eliminated. Odor causing substances can be classified as inorganic gases or organic vapors. These substances create the sensation of odors. The inorganic gases usually arise from bacterial activity; organic vapors often arise from bacterial activity but may result from direct industrial input. Hydrogen sulfide and ammonia are the most common malodorous compounds. Different compounds have different odor thresholds in humans and are affected by different environmental conditions. The most important considerations in the control of odor production in waste water are the conditions that promote the production of H₂S and odorous organic compounds. The reduction of the sulfate ion by bacteria is favored at low pH between 6 and 9, and warm temperatures. Chlorination, aeration, and combustion are all discussed in their application to the control of odor production. The key to complete oxidation of the organic elements undergoing combustion is temperature and contact time of the gases in the combustion chamber. In sludge incineration, temperatures in the combustion chamber should be at least 1400 F; to insure odor destruction, 1500 F is recommended. Catalytic combustion destroys odors at temperatures ranging from 500 to 800 F. Other applications include adsorption, absorption, dilution, and alkaline scrubbing.

22091

APTIC NO. 41623

Davis, John C.

DESULFURIZATION - PART I. ADD-ON PROCESSES STEM H₂S. *Chem. Eng.*, 79(11):66-68, May 15, 1972.

Several add-on processes now being offered can reduce the hydrogen sulfide concentration to less than 250 ppm and yield elemental sulfur at 99% plus conversion efficiency, thus eliminating secondary pollution problems. The widely used Claus route can achieve only about 92% conversion to sulfur in a three stage design. The processes reviewed include the North Western Gas Board Stretford process; the Ralph M. Parsons Co. Beavon process; the J. E. Pritchard Co. Cleanair absorption process; the Institut Francais du Petrole solution Claus process using a polyalkylene glycol solvent and an alkali metal carboxylate catalyst; the Rhodia Inc. Catapan process using a ferrioxalrous redox system; and the Societe Nationale des Petroles d'Aquitaine and the Westvaco Corp. processes, both using activated carbon as adsorbent and catalyst. Relative merits of the systems as they are employed in different situations are discussed.

22092

APTIC NO. 42140

Davis, John C.

DESULFURIZATION, PART 3; MORE SO₂-FROM-RESIDUUM. *Chem. Eng.*, 79(15):36,38, July 10, 1972.

Several new processes for desulfurizing residuum fuel oil are ready for licensing, but only a few have reached commercialization because refiners and the electric power industry are sorting out the relative economics of residuum versus flue gas desulfurization. Another problematic aspect is the possible

changes in air pollution regulations by state legislatures; if the present maximum of a 1% sulfur limit is reduced below 0.3%, incremental costs by catalytic oil desulfurization route are expected to rise faster than those for flue gas. A review is given of current developments in several methods for using residuum fuel oil. Vacuum gas oil hydrodesulfurization achieves 30-35% desulfurization, while direct residuum desulfurization achieves 75% by catalytic methods and 95% with Flexicoking. Flexicoking also yields a low-sulfur, high-metals concentrate which is useful as a source for vanadium and nickel; much of the sulfur is recovered as hydrogen sulfide, which can be processed in Claus or Stretford-type units.

22093

APTIC NO. 41913

Dean, Thomas Stanley

RECOVERING ALKALI METAL SALTS FROM CEMENT KILN GASES BY THE STEPS OF CONDENSING, LEACHING, AND CRYSTALLIZING. (As-signee not given.) U. S. Pat. 3,647,395 6p., March 7, 1972. 6 refs. (Appl. Oct. 21, 1968, 4 claims).

A method is described for removing alkali metal salts from the exhaust gases and dust of a kiln. The alkali metal salts are condensed by any conventional method such as reducing the temperature of the exhaust gases below the volatilization temperature of the alkali metal salts. After the dust containing the alkali metal salts is thoroughly mixed with water, and pressurized if desired, the dust water slurry is heated and the undissolved part is separated from the dissolved part by any of several methods, for example, in a settling tank, by filtration, or passage through a centrifuge. After separation, the clarified water which contains dissolved alkali metal salts, is pumped back to be used with additional flue dust. The discrete particles of the raw materials which are not dissolved in the water, but which are in the devalerated slurry, are again thoroughly mixed with water. This leaching operation is continued in successive steps. After each separation, the solids go to the next separating zone and the water containing some water soluble alkali metal salts goes to the preceding zone to be mixed with the incoming slurry to the tank. The clarified water in the first tank is allowed to increase its concentration of soluble alkali metal salts at an elevated temperature until a concentration is reached which would be a supersaturated solution at a lower temperature. Once this concentration of solubles in the first separating zone is reached, an equilibrium is then maintained by crystallizing out the same amount of soluble alkali metal salts as is added by new particles or dust which is run through the system.

22094

APTIC NO. 41999

Dell, William C.

ADVANCED FLUID BED INCINERATOR. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet., 2nd, Edgewood Arsenal, Md., 1971, p. 203-215. (March 24-25.)*

NTIS, DDC: AD 729929

A fluid bed is formed by flowing air through a bed of inert, non-slugging particles at velocity high enough to support the bed weight but not so high as to sweep the particles out of the bed. If the movement of one specific particle could be observed, it would undergo a continuous turbulent motion, being buoyed by the flowing air. The entire bed moves convectively, analogous to movement of a boiling liquid. Shredded, classified, and dried refuse is fed to the fluidized bed by high measure feeders when combustion of the refuse maintains the inert bed materials and combustion products at 1800 F. The low temperature limits the formation of oxides of nitrogen. Oxides of sulfur are reduced by virtue of the initial low sulfur content of refuse and the high reactivity of the fluidized limestone bed. Limestone is expected to suppress the formation of hydrochloric acid in the same manner as SO_x. The highly stirred, oxygen rich, environment of the fluidized bed provides very favorable conditions for the complete com-

bustion of carbon monoxide and hydrocarbons. The pilot plant will be a complete system capable of consuming 40 tons/day of solid waste and producing 1000 kw of electric power. Components of pilot plant are built to 1/10 scale. The final product should consume 400 t/day at \$2.50/t compared with today's incinerator cost of \$6.00 to \$15.00/t. 0

22095

APTIC NO. 42048

Deschamps, Andre and Philippe Renault

PROCESS FOR THE RECOVERY OF AMMONIA, SULFUR DIOXIDE, CARBON DIOXIDE AND HYDROGEN SULFIDE FROM GAS STREAMS AND FROM AMMONIUM SULFITES, SULFIDES AND CARBONATES. (*Inst. Francais du Pétrole des Carburants et Lubrifiants, Paris (France)*) U. S. Pat. 3,649,190. 6p., March 14, 1972, 2 refs. (Appl. March 20, 1969, 15 claims).

A two-step process is presented for recovering ammonia, sulfur dioxide, and hydrogen sulfide from, respectively, ammonium sulfites or sulfides. In the first step which is usually carried out at a moderate temperature, a salt is contacted with a less volatile acid in a liquid phase containing at least one solvent. During this step, the volatile acid is evolved in the gaseous state while a salt of the less volatile acid is formed. In the second step which is carried out at a higher temperature and/or lower pressure than the first step, the salt resulting from the first step is decomposed in order to liberate the volatile base in the gaseous state and regenerate the liquid phase containing the less volatile acid which may be used again. 0

22096

APTIC NO. 42049

Diah, I. G., L. W. Shemilt, and A. B. Ponter

SULPHUR PRODUCTION BY SIMULTANEOUS H₂S AND SO₂ ABSORPTION. *Chem. Process Eng.* 52(10):75-77, Oct. 1971, 12 refs.

Several methods have been devised to eliminate or reduce the sulfur content of stack gases. One such process involves the recovery of sulfur from sour-gas mixtures, by removing hydrogen sulfide from sour natural gas and recovering elemental sulfur using a liquid medium which contains 90-99% aqueous organic solvent. The aqueous organic solvent acts both as a catalyst and as a medium for the reaction between the two sulfur gases, H₂S and SO₂. The medium is then heated to a temperature above the melting point but below the sublimation temperature of sulfur causing agglomeration of the sulfur particles, thus separating them from the reaction medium. Several applications of this method are discussed. Another method involves the removal of H₂S from a refinery gas or natural gas by reacting it with SO₂ in contact with water-saturated hydrocarbon solvent and a catalytic amount of free water. This process permits the production of sulfur in a granular rather than colloidal form. A modification of this process involves the use of a liquid medium of carboxamide. Ethylene sulfite and ethylene glycol monoethyl ether are the liquid media employee in two other processes. Process flow diagrams are provided.

22097

APTIC NO. 42148

Drechsel, Herbert, Gustav Rovedder, Karl-Heinz Dorr, and Hugo Grimm

PROCESS FOR THE CATALYTIC CONVERSION OF SULFUR DIOXIDE TO SULFUR TRIOXIDE WITH PRODUCTION OF SULFURIC ACID. *Metallgesellschaft A. G., Frankfurt (West Germany)* U. S. Pat. 3,656,900. 9p., April 18, 1972, 3 refs. (Appl. June 24, 1970, 10 claims).

A process for effecting a catalytic conversion of sulfur dioxide-containing gases to produce sulfur trioxide and sulfuric acid is described, wherein the SO₃-containing gases evolving from at least one conversion tray are split with part passing through cooling and absorption operations and part bypassing

these stages. The gas leaving the absorber is recombined with the bypass stream and then fed to the next contact tray. Cooling of the split gas stream is accomplished to the extent that the gas leaving the absorber has a heat content such that when it is combined with the bypass stream, the mixture will be at the proper temperature for feeding to the next contact tray. This process is more economical than previous processes. (Author abstract modified)

22098

APTIC NO. 41276

Dvorzhachek, I. and F. Zhalud

REDUCTION IN THE CONTENT OF HARMFUL SUBSTANCES IN THE EXHAUST GASES FROM THE SKODA INTERNAL COMBUSTION ENGINES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopymi Gazami Avtomob., Proc. Symp.*, 2nd, 1971, 4 refs. Translated from Russian. 19p.

The emission of toxic substances by Skoda car engines was reduced during the first stage of investigation to values within the limits established by the U.N. Economic Commission for Europe (carbon monoxide less than 4.5% of exhaust) by changing the carburetor design. Changes are in progress to further reduce toxic emissions by Skoda car engines by heating the intake line, replacing a combined intake system with individual intake lines for each cylinder, the use of combustion chambers with new shapes, and changing the ignition system. A gasoline injection system is also being developed. Causes of the formation of toxic substances during mixture burning are being investigated to improve the combustion process through design changes.

22099

APTIC NO. 42063

Eckstein, Wolfgang

GAS AND SUSPENDED PARTICULATE FILTERS FOR ADVANCED AIR AND OTHER GAS PURIFICATION PURPOSES. (*Schwebstofffilter und Gasfilter fuer die Feinstreinigung von Luft und anderen Gasen*). Text in German. *Chem. Tech. (Berlin)*, 1(5):235-238, 1972.

Superfine suspended particulate filters must conform to requirements of the Provisional guidelines for the testing of filters for the separation of suspended particulates (including radioactive dust, fogs, bacteria, and viruses) from air and other gases in tests with oil fog aerosols with particles smaller than 1 micron, with radioactively marked aerosols of particle size smaller than 0.3 micron, and with silica dust of a particle size between 0.5 and 2 micron. Superfine filters of the S class must, in such tests, show separation efficiency exceeding 99.7%, 99.55%, and 99% for the above test substances, respectively. A superfine filter size of 610 by 610 by 292 mm containing layers of folded 0.7 mm thick fine glassfiber fabric of a total filtering surface of 20 sq m will process 1700 cu m air/hr with a resistance not exceeding 23 kp/sq m. A tight fit between the filtering material and frame is accomplished by the application of a plastic sealant. To prolong the life of the filter all air is first filtered by a preliminary coarse particle filter. Organic vapors, solvents, and some other substances in trace quantities can be removed by gas filters containing impregnated activated carbon. By reaction with the impregnated material the pollutant is converted to a harmless reaction product which is retained by the filter or carried away in the air stream. Hydrolysable pollutants can sometimes be rendered harmless by the humidity in the activated carbon. Carbon monoxide which cannot be removed by adsorption is catalytically oxidized to carbon dioxide with hopkalit as catalyst. Carbon dioxide is removed from air by a chemically active alkaline mass. Filtering layers of gas filters containing chemical materials in granular form are between 1 and 2 m thick. Superfine filters find wide application in nuclear technology, clean rooms, space technology, the optical industry, computer technology, the food industry, and the pharmaceutical industry.

22100

APTIC NO. 41083

Edl, Wolfgang and Werner Meister

PROCEDURE FOR REMOVAL OF PEROXIDE VAPORS FROM INERT GAS MIXTURES. (*Verfahren zur Beseitigung von Peroxyddämpfen aus deren Gemischen mit Inertgasen*). Text in German. (*Peroxid-Chemie G.m.b.H., Hoellriegelskreuth (West Germany)*) W. Ger. Pat. Appl. 2,026,450. 7p., May 29, 1970. (5 claims).

Volatile organic peroxides are removed from air or inert gas by intimately contacting them with concentrated solutions, over 60 or 70%, of a nonvolatile mineral acid, such as sulfuric acid or phosphoric acid. Countercurrent treatment may be effected in a gas absorption tower, followed by scrubbing with water or an alkali solution. The peroxides that may be removed by this method include peracetic acid, tert-butylhydroperoxide, di-tert-butylperoxide, and tert-butylperoxide esters of acids containing less than six carbon atoms.

22101

APTIC NO. 42281

Edwards, G. E.

PRESENT AND FUTURE OUTLOOK FOR COAL IN AUSTRALIA. *Search*, 2(9):306-312, Sept. 1971. 5 refs.

Typical qualities of Australian coals are considered, including their geological age, class name, chemical composition, and production rates. Australian coals, generally speaking, are high in ash and low in sulfur by comparison with overseas coals, and coal preparation is mainly aimed at ash reduction. In 1969/70, some 58 coal washeries were operating in Australia, averaging just over two different cleaning circuits/plant. Washery refuse disposal problems are mentioned. Jigs remain the most used cleaning unit, although newer plants are being installed with heavy medium cyclones as the major cleaning units, because of their accurate separation and ease of control. Magnetite is used as the heavy medium. Water washing cyclones and froth flotation cells are the next most popular unit operations in new plants, in line with the trend to clean fine coal as well as the coarser fractions. An important development, which is becoming widespread, is the selective beneficiation of certain coals to produce both a coking and a fuel fraction. Another area for the chemical processing of coal is in the removal of impurities from brown coal and lignite. Research, standards, and the future of coal in Australia are considered. 0

22102

APTIC NO. 42089

Egan, Richard L.

WET SCRUBBER SYSTEM. (*Carborundum Co., Niagara Falls, N. Y.*) U. S. Pat. 3,648,440. 4p., March 14, 1972. 5 refs. (Appl. Sept. 2, 1969, 11 claims).

A wet scrubber system is presented which maintains constant pressure drop with varying gas flow or varies the pressure drop in accordance with the process and power requirements. The system includes a receptacle having a gas inlet at its top and a liquid sump at its bottom. The gas is intimately mixed with the scrubbing liquid in a contact section which has a frusto-conical scrubbing device below it. A movable target plate is in the scrubbing section for vertical adjustments in accordance with the pressure drop requirements of the system. (Author abstract modified) 0

22103

APTIC NO. 41776

Eichstedt, R.

ELIMINATION OF ODORS IN A MINERAL OIL REFINERY. (*Beseitigung von Geruchs-Donatoren in einer Erdölraffinerie*). Text in German. *Schriftenreihe Ver. Wasser-Boden-Luftthyg.* (Berlin), no. 35:79-80, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Mercaptans developing in mineral oil distillation were washed out with sodium lye. In this scrubbing process, the lye binds the mercaptans as mercaptides. The latter are removed from

the lye by the entry of elemental sulfur in the form of a highly concentrated suspension. The chemical reaction is analogous to the familiar oxidation with oxygen with the exception that the reaction with elemental sulfur takes place quantitatively already at temperatures between 40 and 50 C under normal pressure. The reaction time depends within certain limits on the concentration of free alkali. The disulfides which form are separated and subjected to further treatment. The lye now contains only sulfide which is converted to sulfate with vapor and air. The lye can then be either recirculated or subjected to further treatment, diluted, and discharged into the receiving stream.

22104

APTIC NO. 42172

Eickelpasch, Dieter, Helmut Kahnwald, and Herbert Tichy

EFFECT OF THE OPERATION PRACTICE ON THE EMISSION OF POLLUTING AGENTS AND CONCLUSIONS FOR THE REDUCTION. (*Der Einfluss des Prozessgeschehens auf Emissionen und Folgerungen zu deren Verminderung*). Text in German. *Stahl Eisen (Duesseldorf)*, 92(12):575-581, June 1972. 8 refs. (Presented at the Eisenhuettentag, Duesseldorf, West Germany, Nov. 4, 1971.)

The close relationship between the raw material, the process conduction, and emission problems is shown by means of three examples. The gaseous fluorine compounds liberated at the sintering process can be converted to harmless calcium fluoride by the calcium oxide present in the sinter burden or that which is added to the process gas. A collection of the gaseous fluorine compounds emitted by the sintering stations with high quantities of waste gas is not yet technically feasible. The method of conversion of gaseous fluorine compounds with calcium oxide will not work if acid sinter must be produced. The quantity of brown smoke produced by steel production depends on the type of oxygen supply and on the decarbonization speed. It can be influenced to some extent at bottom-blown converters by division of the oxygen flow. The major part of brown smoke, however, can only be removed by high-efficiency dust collectors with a collection efficiency of more than 98.5% at arc furnaces and of more than 99.8% at converters. The development of nitric oxide in industrial furnaces depends on the amount of nitrogen chemically bound in the fuel, on the heating and cooling speed of the flue gases, the absolute height of the temperature, and the amount of excess air at the combustion. A reduction of the air surplus reduces the NO development. However, the combustion is not complete, which leads to the emission of carbon monoxide, smoke, and unburned matter. Through a return of 20% of the flue gas to the combustion chamber, a 60% reduction of the NO development was achieved. Injection of water or water vapor also reduces NO formation, but the capacity may be impaired and corrosive processes triggered. The NO formation can be entirely avoided by a two-step combustion or by the arrangement of several burners in the combustion chamber.

22105

APTIC NO. 41116

Eisfeld, Fritz

FILM EVAPORATION VERSUS DROPLET EVAPORATION. (*Filmverdampfung in Konkurrenz zur Tropfenverdampfung*). Text in German. *Umschau (Frankfurt)*, 72(11):364, June 1972. 2 refs.

In some engines, the fuel is distributed in the combustion chamber in the form of droplets; in others, it is distributed on the combustion chamber wall in the form of a film from where it evaporates. For smokeless combustion, a homogeneous mixture of fuel vapor and air must be provided. If the fuel is injected into the combustion air, droplets of different size and speed occur in the combustion chamber. With too much fuel, a lack of air exists which leads to soot development. The method of film evaporation permits a uniform fuel distribution across the combustion chamber, provided the air flow is adequate. Film evaporation, moreover, has the advantage that

the evaporation process can be controlled by the wall temperature. It has the drawback that it causes difficulties at cold starts. The combustion chamber area where the fuel can expand is limited, and the temperature is low. This difficulty must be met by proper flow conduction, such as a strong rotary movement. With film evaporation, soot-free combustion is still possible with a lambda of 0.6. To reduce nitric oxide emissions, a larger air supply is required which raises the carbon monoxide concentration. The latter can be eliminated without great difficulty by afterburning.

22106

APTIC NO. 42042

Emory, John M. G., Jr. and Joseph J. E. Faitani

SMOKE REDUCTION COMBUSTION CHAMBER. (United Aircraft Corp., East Hartford, Conn.) U. S. Pat. 3,643,430. 5p., Feb. 22, 1972. 6 refs. (Appl. March 4, 1970, 6 claims).

Present day gas turbine combustion chambers operate at lean overall fuel-air ratios, which are below the flammability limits of most normally used fuels. Therefore, in order to burn the incoming fuel and air, a region in the burner must be provided in which the fuel is mixed with the correct portion of air in order to initiate and sustain combustion over a wide variety of operating conditions. This is normally done by controlling the airflow distribution into the burner as a function of burner length. Incoming air is divided into primary and secondary air, and the manner of injection, location, and amount of primary air used, in large part, controls the smoke formation characteristics of a combustion chamber. In the combustion chamber of the present invention, a plurality of air tubes are provided at the closed end of the combustion liner. The size, number, and location of these air tubes are optimized to provide a critical airflow into the combustion zone or zones of the combustion liner. The amount of air injected through these air tubes in the front of the combustion chamber is critical and, in a combustion chamber configuration tested, and amount of air to be injected was computed to be from 6-8% of the total primary airflow.

22107

APTIC NO. 41580

Endo, Tetsuo and Kazuo Nakashima

DEODORIZATION BY CATALYTIC COMBUSTION (UOP CATALYTIC COMBUSTION SYSTEM) (Shokubai nensho ni yoru dasshu (UOP kyataitikkū konbasushon sochin). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(5):47-50, May 1972.

The catalytic combustion system produced by Universal Oil Products for deodorization is discussed. By using proper catalysts, the oxidation of odorous compounds occurs at about 350°C. The catalyst used for this system is platinum which is electrically attached on nickel alloy. The temperature limit of the general catalyst is about 650°C; the upper limit of the combustible material in treated gas is 0.2 to 0.7%. Exceeding the limit, the treated gas has to be diluted with air. Vapors of mercury, lead, tin, and zinc poison the catalyst, and halogen inhibits its action. However, the catalyst of this combustion apparatus can be washed and regenerated. An apparatus used in Japan with a treating capacity of 200 kl/day is described. Methane is the preheating fuel; the consumption is 25 N cu m/hr. Ammonia and hydrogen sulfide are the pollutants. Odorous concentration is decreased from 2000 to 214.

22108

APTIC NO. 41814

Eng, Joseph W. and Stanley C. F. Lin

METHOD OF AND APPARATUS FOR PURIFYING POLLUTED GASES. (Electro-Sonic Pollution Control Corp.) U. S. Pat. 3,643,624. 18p., Feb. 22, 1972. 4 refs. (Appl. Sept. 12, 1969, 8 claims).

While presently available techniques are supposed to remove large or coarse solid particles present in contaminated gas streams, no provisions are made for effectively removing

small, micron-, and submicron-sized particles. In addition, efficient, low flow, resistant equipment which can be installed within gaseous discharging conduits, such as chimney stacks, has not been generally available. A method is described for removing contaminants from polluted gases by passing such gases through a low flow resistant, porous, infinite capacity filter, in which ultrasonically generated, oscillating fog droplets and agglomerates contaminants. Preferably the fog droplets are charged electrically and activated chemically, as well as generated in a range of sizes best suited for removing contaminants from the polluted gases. (Author abstract modified) 0

22109

APTIC NO. 41954

Engelhardt, Heinz and Werner Schaefer

THE MEASUREMENT OF AND POSSIBILITY OF REDUCING THE EMISSION OF NOXIOUS SUBSTANCES FROM THE SPARK-IGNITION ENGINE. (Die Schadstoff-Emission des Ottomotors, ihre Messung und die Möglichkeit zu ihrer Verminderung). Text in German. Chem.-Ing.-Tech., 44(10):645-652, May 1972. 17 refs.

There are two ways in which the emission of carbon monoxide, hydrocarbons, and nitric oxide from internal combustion engines can be reduced: elimination of the original cause of noxious substances, e.g., by improvements to the construction of the inlet side of the engine or optimum adjustment of carburetor and ignition system and by removal of the noxious substances formed by thermal or catalytic afterburning. Test methods are described which, with the aid of automatic gas analyzers, make it possible to control the composition of the exhaust within the limits required by law. Processing of the data by computer accelerates evaluation of results of the test to such an extent that it can also be used for production control. The development of test methods for the objective determination of pollutant emission by Otto engines originated in California. On a dynamometer, typical driving conditions are simulated. Another test was developed in the Federal Republic of Germany which especially suits the meteorological and traffic conditions of Europe. The exhaust gas produced during the driving test is collected in large synthetic bags and volumetrically measured. The United States recently also introduced the exhaust gas volume measurement together with a new more differentiated driving cycle lasting 1369 sec. It is much longer than the driving cycle of the European test which last 780 sec. The analyzing systems necessary for the driving tests are described. They include a flame ionization detector (for HC measurement) and infrared analyzers for CO and NO measurements.

22110

APTIC NO. 41932

Ennan, A. A., V. A. Anikeev, I. P. Berezina, A. G. Firsov, A. N. Chobotarev, and V. M. Kats

HYDROGEN FLUORIDE EXTRACTION BY MEANS OF AN ALPHA-NAPHTHYLAMINE BENZENE SOLUTION. (Ekstraktsiya fluoristogo vodoroda benzolnym rastvorom alfa-naftilamina). Text in Russian. Zh. Prikl. Khim., 45(4):854-857, 1972. 14 refs.

In search for new means of hydrogen fluoride emission control, interactions between concentrated or diluted HF water solutions and alpha-naphthylamine benzene solutions as affected by the concentration of the amine were studied. Included are III partition data between water and the organic phase utilizing 0.1 and 0.5 mole/l alpha-naphthylamine in benzene. Increasing HF concentrations in water enhanced its extraction by the organic phase. Higher concentrations of the amine increased the extraction power of the organic phase with the formation of an alpha naphthylamine monofluorohydrate. Utilization of 0.5 mole alpha naphthylamine/l benzene solutions led to the formation of a solid difluorohydrate derivative reaching 93.4% HF extraction yields for a 36.3% HF water solution concentration. Recovery of the extracted HF was made by treatment of the

fluorohydrate with saturated sodium fluoride solutions. Utilization of alpha-naphthylamine for the extraction of HF from water solutions was feasible for the above purpose.

22111

APTIC NO. 41673

Ferguson, H. W.

HUMBLE S APPROACH TO POLLUTION CONTROL.

Proc. Am. Petrol. Inst., Sect. III, vol. 36:304-305, 1956.

Air pollution problems at a 280,000 bbl/day oil refinery located in the Houston Ship Channel are corrected by installing alternate processes which eliminate contaminants at the source whenever such measures are economically justified by otherwise needed modernization. This has included construction of a hydrogen sulfide-to-sulfur conversion unit which in 1954 recovered 12,000 long tons of sulfur from refinery gases. Waste disposal facilities are included in the base plans for all new plant units. A Pollution Abatement Committee reviews all new process and modernization plans to insure that adequate waste disposal facilities are provided, coordinates pollution control efforts, and disseminates information on new abatement techniques. An Operating Committee maintains close supervision of all waste disposal operations. Employees, the public, and the control authorities are kept informed of the abatement program, and all complaints are analyzed thoroughly. In the past 7 years, \$4 million for air pollution control and \$5 million for water pollution control has been spent at this plant. (Author abstract modified)

22112

APTIC NO. 42078

Fischer, Friedrich and Karl-Heinz Pfefferle

WASTE GAS CLEANING PROCEDURES. (Verfahren zur Abluftreinigung). Text in German. Chem. Tech. (Berlin), 1(5):215-219, 1972. 6 refs.

Pollutants from industrial gaseous effluents can be removed by adsorption, thermal combustion, catalytic combustion, absorption, or by a combination of two of these methods. Adsorption with activated carbon is applied when the recovery of organic vapors is desired which would otherwise create a malodorous and harmful work environment. The contaminated effluents are drawn by suction produced by blowers through a layer of the adsorbent which is, after saturation, regenerated by steam. The recovered solvent steam mix is condensed and distilled. Fully automatic equipment in a number of modifications is now available. Per ton of recovered solvent, 0.5 kg activated carbon, 100 kWh energy, 2.5 tons steam, and 30-50 cu m cooling water is required. Where recovery is not feasible because of low concentration or a multicomponent mix, thermal or catalytic combustion is more economical. Combustion of halogen, sulfur, or nitrogen compounds, which would make catalytic combustion impossible, is accomplished between 650 and 850 C. The heat required is supplied by combustion of consumer gas; the cost of operation of such an installation is approximately \$18/hr. Catalytic combustion can be applied when nothing but carbon dioxide and water result. The process works with temperatures between 250 and 500 C, depending on the catalyst used; the hourly operational cost of such an installation is approximately \$8.00. In the case of water-soluble solvents, recovery can be achieved by absorption such as in the recovery of acetone and dimethylformamide which are scrubbed with water and subsequently distilled, or in the recovery of hydrogen fluoride which is scrubbed by a solution of potassium hydroxide and converted to calcium fluoride. Sometimes, two or more processes must be combined, such as in the recovery of carbon disulfide and the simultaneous elimination of hydrogen sulfide from gaseous effluents in the manufacture of viscose, where the first step is accomplished by adsorption, the second by scrubbing with an alkaline solution, and subsequent oxidation to elementary sulfur.

36

22113

APTIC NO. 41113

Fleming, R. D. and J. R. Allsup

EMISSION CHARACTERISTICS OF NATURAL GAS AS AN AUTOMOTIVE FUEL. Preprint, Society of Automotive Engineers, Inc., New York, 7p., 1971. 8 refs. (Presented at the Society of Automotive Engineers, National Combined Fuels and Lubricants, Powerplant and Truck Meetings, St. Louis, Mo., Oct. 26-29, 1971, Paper 710833.)

A study of natural gas as a low pollution automotive fuel was conducted using a single cylinder engine, a multicylinder engine, and six vehicles. The light-load, lean-limit misfire region of natural gas begins at an air-fuel ratio between 140-150% of stoichiometry. Changes in ignition timing significantly influenced emissions of nitrogen oxides and hydrocarbons but had little effect on carbon monoxide emissions. Lower emissions can be achieved with current engine designs by adjustment, but with heavy penalty to engine performance. Emissions from vehicles fueled with natural gas are virtually unaffected by temperature change within the range 20-100 F. Natural gas exhaust is estimated to be 22-25% as reactive as gasoline exhaust. (Author abstract modified)

22114

APTIC NO. 41215

Fomin, A. A.

NEUTRALIZATION OF HARMFUL SUBSTANCES IN THE EXHAUST GASES OF GASOLINE AND DIESEL ENGINES. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopnyimi Gazami Avtomob., Proc. Symp., 2nd, 1971. Translated from Russian. 8p.

The measures designed to limit the toxic exhaust emissions from running engines can be reduced to meaningful technical maintenance during the first stage. The quantity of toxic substances ejected into the atmosphere depends to a considerable extent on the technical condition of the engine, and in particular the condition of the feed and ignition systems. Mass-produced Soviet-made automobiles were tested by statistical survey for carbon monoxide exhaust at idling speeds and the possibility of reducing the CO content was evaluated. Results revealed that over 50% of the vehicles in operation emit more than 4.5% CO in the idling speed mode. It is desirable to adjust the idling speed and to tune the ignition system at maximum vacuum in the intake manifold because this reduces CO emission and results in fuel economy. The use of catalytic neutralizers, installed in transportation equipment in place of mufflers and providing for the flameless afterburning of CO, aldehydes, and hydrocarbons contained in the exhaust gases of gasoline and diesel engines is promising. Tests made of experimental models of neutralizers under vehicle operating conditions show that the efficiency of the neutralizers remains practically the same over runs of up to 20,000 km.

22115

APTIC NO. 41114

Ford, H. S., D. F. Merriam, and R. J. Hames

REDUCING HYDROCARBONS AND ODOR IN DIESEL EXHAUST BY FUEL INJECTOR DESIGN. Preprint, Society of Automotive Engineers, Inc., New York, 7p., 1970. 8 refs. (Presented at the Combined National Farm, Construction and Industrial Machinery and Powerplant Meetings, Milwaukee, Wis., Sept. 14-17, 1970, Paper 700734.)

Exhaust hydrocarbons and odor were reduced in Detroit Diesel Series 71 engines by revising the fuel injector tip design. Five injector tips were investigated which had different volumes of uncontrolled fuel below the injector valve. Results are presented to show that exhaust hydrocarbons and odor can be substantially reduced by minimizing the uncontrolled volume of fuel in the injector tip. The hydrocarbon emissions are attributed to uncontrolled fuel being pushed from the tip

by expansion of the fuel at elevated temperatures. This conclusion is supported by test results with fuels having different 10% distillation temperatures. (Author abstract)

22116

APTIC NO. 41782

Forberg, W.

PROBLEMS AT THE ELIMINATION OF INTERMITTENT EMISSIONS. (*Probleme bei der Beseitigung intermittierend anfallender Emissionen*). Text in German. Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no. 35:101-103, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Odor elimination becomes extremely difficult when the waste gas quantities vary greatly with occasionally high concentration peaks. A combination of waste gases with other gases for joint treatment is not feasible because of the danger of explosions. In one case where 70 kg sulfur dioxide/hr was to be removed, an alkaline scrubbing process was selected. The SO₂ was recovered. Such a solution is rare, however, in the case of organic substances. Enormous difficulties are encountered with catalytic afterburners. A plant where investment costs amounted to approximately \$0.3 million had to be abandoned because it operated inefficiently. The elimination of organic substances in a flare was studied in the laboratory. Methyl ethyl ketone could be burned so completely that the substance was not detected in the cleaned gas. The elimination of pyridine by a flare was not so successful. Similar results as those obtained with flares were obtained with muffle furnaces. Both are not ideal and not applicable for every substance.

22117

APTIC NO. 42010

Fox, U.

HEAT RECOVERY FROM THE AIR DISCHARGED BY AIR CONDITIONED BUILDINGS. (*Wärmerückgewinnung aus der Fortluft von klimatisierten Gebäuden*). Text in German. Heizung-Lüftung-Haustech., 23(4):104-106, April 1972. 5 refs.

Heat recovery systems from the air discharged by air conditioned buildings are described and the costs for recovery are calculated. The cost calculation was carried out with the assumption that the temperature of the air discharged is 22 C, its humidity 40%, and the maximum temperature of the inflowing air is 18 to 20 C. The specific costs for heat production were assumed to be 2.5 cents/kcal/hr, for cooling 10 cents/kcal/hr, for the heat exchanger 1 cent/kcal/hr, and for the regenerative heat exchanger 20-25 cents/cu m/hr. The life-time of components needed for heat recovery was assumed to be 20 years. For the heat recovery by the regenerative method the optimum is achieved at a pressure loss of about 2 times 20 mm water (based on a price of 2.6 cents/kWh for electricity). The best known method of heat recovery is the constant circulation of an air flow to which a small fraction of external air is mixed. Another method (the so-called regenerative method) makes use of a rotating roller with a perforated inner part. Through the rotation of the roller and a not absolute separation of the incoming and outgoing air part of the waste air is mixed with the incoming air. Another method the waste air transmits heat (or cold) via aluminum heat exchanger surfaces to the incoming air. Finally, heat can be recovered by means of activated coal.

22118

APTIC NO. 41074

Freeman, Max A. and Roy C. Nicholson

VALVE TIMING FOR CONTROL OF OXIDES OF NITROGEN (NOX). Preprint, Society of Automotive Engineers, Inc., New York, 14p., 1972. 7 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972. Paper 720121.)

Three engine camshaft approaches to the reduction of oxides of nitrogen were investigated: increased valve overlap, variable camshaft timing, and variable valve overlap. The interac-

tion of these systems with emissions, fuel consumption, and power was evaluated on a dynamometer engine. The effects of air-fuel ratio and exhaust back pressure were also reported. Results of the dynamometer study were verified with vehicle tests. Oxides of nitrogen levels of 1.2-2.0 g/mile were attained through camshaft design with acceptable drivability on the 1970 federal test procedure. (Author abstract)

22119

APTIC NO. 42166

Frybourg, M.

AUTOMOBILES AND NUISANCES. (*Automobiles et nuisances*). Text in French. Pollut. Atmos. (Paris), 14(5):159-162, April-June 1972.

Nuisances caused by automotive emissions as well as emission control measures are reviewed. The cumulative effect of the exhaust components has not been fully investigated. Nitrogen oxides create the most difficult and expensive control problems of all components. While research is mainly centered on improving combustion, catalytic reactors still present quality problems. New solutions such as gas turbine, steam, electric, or external combustion engine is a potentiality, and traffic regulations and modifications to avoid congestion, and thus reduce emissions, may be of value. An average increase of \$1000 in the purchase price of a 1976 U. S. car model, due to the exhaust emission control measures envisaged, is predicted. While the health hazards of lead in gasoline have not been fully substantiated, low-lead rather than no-lead gasoline should be required. No-lead gasoline would cause increased carcinogenic hydrocarbon emissions, but it would eliminate the problem of catalyst poisoning.

22120

APTIC NO. 41579

Fukusaki, M.

CHARACTERISTICS OF FMAX AND RODAX METHODS AND ECONOMIC COMPARISONS WITH OTHER SYSTEMS. (*Fumakkusuho rodakkusuho no tokuho to tasochi to no keizai hikaku*). Text in Japanese. Kogaku kojo (Chem. Factory), 16(5):89-93, May 1972.

The FMAX method for desulfurization and RODAX method for decyanization of gas are described and compared to other methods in view of economics. The FMAX method consists of an absorbing tower to absorb hydrogen sulfide and a regenerating tower to regenerate the absorbing liquid; hydrogen sulfide is oxidized to sulfur. The H₂S is first absorbed by FMAX liquid which is a 2 to 3% sodium carbonate aqueous solution containing 0.1% picric acid. It is then oxidized to sulfur, whereas picric acid is reduced to triamine and loses its activity. In the Rodax method, ammonium persulfide is reacted with ammonium cyanide, which results from the absorption of hydrogen cyanide with ammonia, to form rodan salt. A combination of FMAX and RODAX methods is developed. Both methods are very economical due to the low cost of catalysts. A comparison of the cost of operation with other methods is tabulated.

22121

APTIC NO. 42293

Fukuzaki, Michiyuki

FEATURES OF DESULFURIZATION AND CYANIDE REMOVAL PROCESSES (FUMAKS AND RHODACS PROCESSES) -- HOW THEY COMPARE WITH OTHER PROCESSES. Chem. Economy Eng. Rev., 4(5):42-46, 61, May 1972.

The Fumaks wet desulfurization and the Rhodacs cyanide removal processes are reviewed. In the Fumaks process, hydrogen sulfide in crude gas is absorbed into a liquid in the absorption column. In the regeneration column, the impure liquid is oxidized with air to recover sulfur, while the liquid is regenerated for recirculation. In the Rhodacs process, ammonia, H₂S, and hydrogen cyanide are removed in the form of ammonium rhodanate. All these compounds can be removed simultaneously without using any auxiliary raw material by

combining both processes. The Fumaks and Rhodacs processes are used at steel works which have coke ovens and at chemical plants; application of the processes at oil refineries and chemical fiber plants are considered. The economics of use, operation results, and advantages of the processes are presented.

22122

APTIC NO. 42286

Gast, Richard A. and Harry R. Mitchell

EXHAUST EMISSION CONTROL SYSTEM. (General Motors Corp., Detroit, Mich.) U. S. Pat. 3,653,212. 8p., April 4, 1972. 4 refs. (Appl. Oct. 30, 1970, 10 claims).

An exhaust emission control system for an internal combustion engine is described, which comprises an air injection system where exhaust system pressure pulsations are used to induce air flow through an air induction valve to the engine exhaust ports. Air is delivered to the stream of exhaust gases as they are emitted from the combustion chamber. None of the previous air injection methods delivered air to the stream of hot gases as they were emitted from the combustion chambers directly adjacent to the exhaust valves, nor were they adequate to induce sufficient air flow into the exhaust system to reduce the amount of unburned constituents to meet present day emission control standards. (Author abstract modified)

22123

APTIC NO. 41075

Genslak, Stanley L.

EVALUATION OF GASEOUS FUELS FOR AUTOMOBILES. Preprint, Society of Automotive Engineers, Inc., New York, 14p., 1972. 10 refs. (Presented at the Automotive Engineering Congress Detroit, Mich., Jan. 10-14, 1972, Paper 720125.)

An evaluation of gaseous fuels was made to determine their capability in reducing emissions from automobiles. The four-part program included tests of propane and natural gas in a dynamometer engine, as well as in a car parameter study. Power and spark requirements were compared with those of gasoline on the dynamometer engines. Emissions, economy, performance, and driveability were evaluated for the cars; air-fuel ratio, spark advance, and exhaust gas recirculation served as variable parameters. The third phase of the program determined the low emission capability of a liquefied petroleum gas car with proposed emission hardware. Economy, performance, and driveability at these low levels were obtained. The final phase tested a dual-fuel car to evaluate the feasibility of using liquefied petroleum gas to start and warm-up the car, followed by an automatic switch to gasoline. Emissions, driveability, and the liquefied petroleum gas fuel consumption were recorded. (Author abstract modified)

22124

APTIC NO. 41115

Gerassimov, Michail M., Dimitar G. Elenkov, Dimitar D.

Rushtshev, Elena E. Bekjarowa, Alexander Ass.

Alexandrov, Georgi Kr. Schopov, and Georgi Gr. Grozev

PREPARATION OF ADSORPTION SEMI-COKE FROM LIGNITE COAL FOR THE DESULFURIZATION OF FLUE GAS IN THERMAL POWER STATIONS.

(Herstellung eines Adsorptions-Schmelkokses aus Lignitkohle zur Abgasentschwefelung in thermischen Kraftwerken). Text in German. Erdöl Kohle (Hamburg), 25(5):248-252, May 1972. 23 refs.

Laboratory experiments were carried out on the preparation of adsorption semi-coke from the xylite fraction of lignite coal stemming from the mine Tschukurovo near Sofia. The xylite samples had a moisture content of 10.79 to 21.50%, an ash concentration of 1.20 to 5.00%, a concentration of volatile components of 56.40 to 60.50%, and a total sulfur content of 0.64 to 0.78%. Thermal treatment was carried out with end temperatures of 350, 400, 450, 500, 550, 600, 650, 700, 800, and 900 C. The heating-up speed to the end temperature was varied. The semi-coke output did not change much with the

heating-up speed. Increasing end temperature decreased the semi-coke output due to increased thermal dissociation. The product from the class of 5 to 10 mm thermally treated at 750 C showed the highest sorption capacity for waste gas desulfurization. From a model gas mixture of 91.5 volume per cent N₂, 8 volume per cent O₂, and 0.4 to 0.55 volume per cent SO₂, this product adsorbed 0.0307 g SO₂/g adsorbent at 25 C, 0.00742 g/g at 50 C and 0.00434 g/g at 92 C. The more important physical-chemical properties of this semi-coke are as follows: moisture, 4.05 to 7.88%; ash, 4.86 to 5.97%; volatile components, 2.46 to 3.20%; sulfur, 0.39 to 0.46%; carbon, 96.45 to 96.76%; hydrogen, 1.34 to 1.37%; heating value, 7181 to 7552 kcal/kg; and porosity, 35.5%. The semi-coke has extremely fine pores. Under dynamic conditions, the sorption properties exceed those of the activated coals D47/4 (Germany) and Kintal (Japan).

22125

APTIC NO. 42189

Gerriets, Edyard

REFUSE AND EFFLUENT REMOVAL. (Die Abfall- und Abwasserbeseitigung). Text in German. Bundesgesundheitsblatt (Berlin), no. 7:106-108, March 1972.

When slaughtering animals, 35% of the gross weight of the animals is waste. Usually the meat refuse in slaughterhouses is fed into large containers by means of a floating system and blood is sucked by means of vacuum pipe lines into the same containers. From there the collected refuse is transported into flaying houses by means of tank trucks. The refuse is treated in an extractor which sterilizes, extracts, and dries the material. During the whole operation, the extractor is completely closed and the developing vapors settle in condensers so that bad odors cannot escape into the open air, and nuisance of the environment is avoided. The extractor produces 25% fowl flour, 18% blood flour, and 40% feather flour which is an excellent food for cattle owing to the low water and grease content and the high percentage of proteins.

22126

APTIC NO. 41741

Giconi, Renell A.

GAS SCRUBBER APPARATUS AND METHOD FOR USE THEREOF. (Assignee not given) U. S. Pat. 3,637,192. 7p., Jan. 25, 1972. 5 refs. (Appl. Aug. 13, 1970, 14 claims).

An apparatus is described which successfully scrubs a gaseous smoke stream. The gas stream is led first into a chamber in which the stream is cooled from an initial temperature of 1500 F. An impingement fluid is provided by means of a plurality of fans which cools the impure gas. The gas is then conveyed to a second chamber and mixed with a water vapor mist to further cool the gas and at the same time encapsulate the solid constituents of smoke. The gas is conveyed to a third chamber in which water is sprayed by means of a plate having many holes. A heater arrangement insures effective mixture between the gas and the spray.

22127

APTIC NO. 41756

Gillespie, G. R., A. A. Boyum, and M. F. Collins

NITRIC ACID: CATALYTIC PURIFICATION OF TAIL GAS. Chem. Eng. Progr., 68(4):72-77, April 1972. 6 refs.

The new federal regulations for nitrogen oxides emissions from nitric acid plants are examined. For new plants, the maximum nitrogen oxides permitted in the effluent will be 3.0 lb/ton of acid produced, or a concentration of 209 ppm. For existing plants the maximum nitrogen oxides permitted will be 5.5 lb/ton of acid, or 400 ppm. The basic causes for past problems in nitrogen oxides abatement are discussed. Reduction of catalyst activity is the reason for failure to attain desired product compositions in many processes. The specific causes for loss of catalyst activity have been carbon deposition, catalyst poisons, and thermal degradation. These can lead to poor fuel efficiencies, high ignition temperatures, poor conversions, temperature cycling, and short catalyst life. Carbon

deposition is accelerated by poor mixing of fuel and tail gas, and/or by excessive fuel/oxygen ratios. A system is recommended that will meet federal emission standards. It consists of the following features: single stage abater, abater bypass for startup and shutdown, spherical palladium catalyst, and fuel desulfurization. The control features incorporated into the system include: inlet temperature control, fuel/oxygen ratio control, temperature protection of catalyst, and temperature protection of turbine. Predictions of future catalyst developments are given, including the use of particulate catalysts, unitary honeycomb catalysts, and selective catalytic reduction.

22128

APTIC NO. 41936

Goldsmith, Alexander

METHOD OF SMOKE REDUCTION AND APPARATUS THEREFOR. (Dept. of the Navy, Washington, D. C.) U. S. Pat. 3,644,073. 5p., Feb. 22, 1972. 2 refs. (Appl. Nov. 25, 1970, 10 claims).

In the training of men in the fighting of shipboard fires, aircraft crashes, and the like, it has been the practice to float oil on the free surface of an otherwise confined body of water and set it afire. A method is presented of reducing the amount of smoke associated with these fuel oil fires by utilizing atomized water sprays which impinge on the fire just above the layer of burning oil. Water is pumped through spray heads at controlled rates via a distribution system immersed in the water beneath the burning oil to prevent generation of steam. (Author abstract modified)

22129

APTIC NO. 41793

Graven, Richard G.

PRODUCTION OF LEAD FREE GASOLINE. (Mobil Oil Corp., New York) U. S. Pat. 3,649,520. 8p., March 14, 1972. 6 refs. (Appl. March 13, 1970, 3 claims).

The yield of lead free gasoline product can be increased when upgrading low octane gasoline boiling material by a combination of process steps generally known in the prior art. These petroleum refining operations include hydrogenation, reforming, aromatic recovery, isomerization, and product separation steps arranged in a combination which is particularly effective for producing gasoline products of desired octane rating. The present method particularly emphasizes the upgrading of relatively low octane C6 hydrocarbon components, as well as the removal of low octane C7 paraffins.

22130

APTIC NO. 41809

Greenberg, Jacob

METHOD OF CATALYTICALLY INDUCING OXIDATION OF CARBONACEOUS MATERIALS BY THE USE OF MOLTEN SALTS. (Anti-Pollution Systems, Inc., Pleasantville, N. J.) U. S. Pat. 3,647,358. 11p., March 7, 1972. 9 refs. (Appl. July 23, 1970, 47 claims).

An efficient and inexpensive process is described for oxidation of unburned carbon monoxide and hydrocarbons contained in smokestacks and automotive exhaust systems. Previous attempts to remove these impurities often utilized an afterburner, requiring an expensive heat transfer system which was generally wasteful of fuel, and which in turn generated exhaust gases which created further air pollution problems. In the present method, carbonaceous materials are brought into contact with a molten salt which is characterized by a relatively low melting temperature and high stability with respect to the materials and air. The molten salt has the property of catalytically inducing oxidation of the carbonaceous materials in the presence of oxygen.

22131

APTIC NO. 42040

Griffin, Lindsay L. Jr. and Albert B. Welty, Jr.

FLUE GAS DESULFURIZATION WITH AMMONIUM SULFITE. (Esso Research and Engineering Co., Linden, N. J.) U. S. Pat. 3,645,671. 5p., Feb. 29, 1972. 6 refs. (Appl. Oct. 24, 1969, 8 claims).

A process is described which will effectively remove sulfur dioxide from flue gas under widely varying load conditions, which can be installed in existing power plants, and which is simple and economical to operate. The flue gas is desulfurized by absorption in aqueous ammonium sulfite in a multiple stage, countercurrent absorber. The absorber effluent is divided into two portions, and one portion is reacted with ammonium bisulfite to liberate SO₂. The resulting ammonium sulfate, which is in the form of an aqueous slurry, is contacted with hot combustion gases in a decomposer to form molten ammonium bisulfite and ammonia gas. The ammonium bisulfite is returned to the acidifier. The ammonia gas is contacted with the second portion of the ammonium bisulfite effluent solution from the absorber in order to form the ammonium sulfite containing absorbent solution.

22132

APTIC NO. 42072

Grimm, Carlton Dencker

THE ROLE OF THE SUPPORT IN CATALYTIC HYDRODESULFURIZATION OF DIESEL FUEL. Montana State Univ., Bozeman, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1971, 173p., 25 refs.

Promoted alumina silica catalyst supports were studied for their hydrodesulfurization properties. Two support classes were used: molecular sieves with their uniform crystalline structure and low pore diameter of 10 Å, and the noncrystalline silica alumina supports whose pore diameters ranged from 50 Å upward to 180 Å. Cobalt and molybdenum were deposited on the molecular sieves near two target figures: 3% Co 15% Mo and 5% Co 10% Mo. An ammonium ion molecular sieve was used to ion exchange cobalt or nickel onto the support with the deposited cobalt and molybdenum. Nickel and tungsten promoted molecular sieves were near 3% Ni 15% W. The noncrystalline supports were promoted near 3% Co 15% Mo. The influence of pore size, pore volume, alumina and silica content, surface area, and density were noted for each promoted base material. Diesel fuel oils with 1.5-2.0 weight% sulfur were used for the hydrodesulfurization runs. The promotion amount and support surface areas did not affect desulfurization results as did pore size and pore volume. (Author abstract modified)

22133

APTIC NO. 41608

Gross, George P.

THE EFFECT OF FUEL AND VEHICLE VARIABLES ON POLYNUCLEAR AROMATIC HYDROCARBON AND PHENOL EMISSIONS. Preprint, Society of Automotive Engineers, Inc., New York, 20p., 1972. 29 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720210.)

Exhaust emissions of polynuclear aromatic hydrocarbons and of phenols were studied with a variety of test fuels, using cyclic tests in five vehicles including one with emission control, two with engine modification control, and two with experimental very low emission systems. The experimental systems both reduced phenol emissions to less than 0.5% and polynuclear aromatic hydrocarbon emissions to about 1% of the levels observed in the vehicles without emission control. Phenols were reduced 30% by one engine modification control vehicle, while polynuclear aromatic hydrocarbons were reduced by 70% in both engine modification control vehicles. Fuel composition influenced emissions both directly and through engine deposits, although these direct effects of fuel composition generally decreased in the emission controlled vehicles. High polynuclear aromatic hydrocarbon emissions occurred with deposits from a fuel containing lead and phosphorus; an unleaded fuel, of different hydrocarbon composition and without phosphorus, gave low emission deposits, but this same fuel, with lead added at 0.5 g/gallon, still gave low emission. Sampling procedures are mentioned. The control systems included carburetion variations, thermal and catalytic afterburners air fuel ratio changes, and a spark-retard system.

Emissions of carbon monoxide benzo(a)pyrene, benz(a)anthracene, hydrocarbons, and nitric oxide were measured. (Author abstract modified)

22134

APTIC NO. 41709

Gruden, Dusan

EXHAUST GAS EMISSION AND EXHAUST GAS ODOR OF THE FOUR STROKE OTTO ENGINE. (*Abgasemission und Abgasgeruch des Viertakt-Fahrzeug-Ottomotors*). Text in German. *Automobiletech. Z. (Stuttgart)*, 74(5):180-188, May, 1972. 12 refs.

Studies on the effects of different design and operational parameters of Otto motors on the composition and odor of the exhaust are described. An ellipsoid-shaped combustion chamber was found to be best regarding minimum nitric oxide, carbon monoxide, and hydrocarbon emissions, while the effect of the shape of the combustion chamber on the exhaust composition was not considerable. Chambers providing intense turbulence and rapid and complete combustion were found best regarding the exhaust composition. It was not possible to find a relationship between the chamber surface to volume ratio and the hydrocarbon content in the exhaust gas. Improved mixture distribution to the cylinders is the basic means of reducing the CO, NO, and hydrocarbon contents in the exhausts. Each operation point within the partial load range was optimized in view of fuel consumption or exhaust composition by the proper choice of such parameters as excess-air coefficient, preignition and delivery rate. Such a procedure for a four-stroke Otto engine revealed that the optimization of the single components (fuel consumption, CO, NO, hydrocarbons) required different combinations of the above parameters, i.e., there was no engine adjustment permitting all components to reach simultaneously their respective minima possible. Thus, the combined optimization of the different components is of major importance. The hygienic requirement of minimum toxicity of the exhaust can be satisfied only at the cost of increased fuel consumption. The odor of exhaust gases was found to be determined by nitrogen dioxide, and unburnt and partly oxidized hydrocarbons. The relationship between odor intensity and the established maximum allowable concentrations of the individual components was determined. Minimum odor intensity was found at excess-air coefficients below 1.0, and maximum between 1.1 and 1.2. Variations of the odor threshold as a function of load and speed of rotation were determined.

22135

APTIC NO. 42115

Gruia, Maria

USE OF CATALYSIS FOR ABATEMENT OF AIR POLLUTION. (*Cataliza in lupta impotriva poluarii atmosferei*). Text in Romanian. *Rev. Fiz. Chim. Ser. A*, 9(2):58-60, 1972. 22 refs.

Catalysts adequate for the abatement of air pollution produced by spark and diesel engines must oxidize carbon monoxide to carbon dioxide, oxidize various hydrocarbons to CO₂ and water, and convert nitric oxide to nitrogen. Supported platinum or palladium as well as various mixtures of oxides, chosen among copper oxide, cobaltous oxide, ferric oxide, manganese dioxide, chromic oxide, and nickel oxide, seem promising for this task.

22136

APTIC NO. 41212

Gusarov, A. P., V. F. Kutenev, and A. A. Charykov

THE INFLUENCE OF CARBURETOR SYSTEM ADJUSTMENTS ON THE EJECTION OF TOXIC SUBSTANCES WITH THE EXHAUST GASES FROM AUTOMOBILES.

Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic. *Snizheniye Zagryaz. Vozdukh Gotozkh Vvkhlopnym Gazami Avtomob.*, Proc. Symp., 2nd, 1971. 2 refs. Translated from Russian. 10p

The results of investigation using several automobile models to select carburetor system adjustments providing reduced toxic emissions without causing a deterioration in dynamic and economic vehicle parameters are presented. Adjustment idling speed with the mixture control screw affects the concentration of exhaust carbon monoxide at engine idling speed, at steady speeds, and at positive engine idling speed. Reduction of exhaust CO from 6.0 to 4.5% at idling speed reduces the emission of CO during the driving cycle by 15 to 30%. Change in the productiveness of the idling speed fuel jet in the carburetor of Model 2 from 65 to 50 cu cm/min reduced the emission of CO by 13% and hydrocarbons by 8%. Adjustment of the main metering system had a significant effect. A change in the position of the adjusting needle in the main fuel jet of the carburetor of Model 3 from 720 to 540 deg reduced the emission of CO and hydrocarbons by 65 and 48%, respectively. A change in the productiveness of the main fuel jet in the carburetor of the Model 2 from 185 to 160 cu cm/min reduced the emission of CO and hydrocarbons during the driving cycle test by 56 and 23%, respectively.

22137

APTIC NO. 41078

Gustavsson, Karl-Axel Goran

APPARATUS FOR CLEANSING FLUE GASES. (*Aktienbolaget Bahco Ventilation, Enkoping (Sweden)*) U. S. Pat. 3,640,053. 6p., Feb. 8, 1972. 5 refs. (Appl. June 1, 1970, 2 claims).

An apparatus is presented for removing sulfur dioxide and secondary products of combustion, such as soot, coke dust, and ash, from flue gases. It comprises a container for treatment liquid and a gas inlet arranged so that the gas flows substantially at right angles to the surface of the liquid. A treatment passage extends vertically upward from the liquid surface in the container, and the gas after contact with the liquid flows through linearly entraining droplets of liquid. The container communicates below the liquid level with an equalizing tank which has means for introducing alkali to maintain the treatment liquid at a suitable alkalinity and with means for introducing fresh water. The equalizing tank also has means to maintain the liquid level constant whereby the level in the treatment container adjusts automatically to variations in the rate of gas supplied to it. Previous methods for removing impurities from flue gas involved an extensive exchange service and service program, resulting in high costs, and problems in achieving sufficient contact times. (Author abstract modified)

22138

APTIC NO. 40999

Gutina, N. I., I. A. Fainerman, and V. A. Shalaev

HIGH-SPEED SEDIMENTATION-TYPE, HELICAL-CONVEYOR CENTRIFUGE OGSH-35. (*Skorostnaya osaditel'naya shnekovaya tseftrifuga OGSH-35*). *Khim. Neft. Mashinostr.*, no. 10:2-3, 1971. 2 refs.

Construction and operating characteristics are given of a new, high-speed, sedimentation-type, helical-conveyor centrifuge OGSh-35. It is made of steel or titanium alloys. Depending on the requirements of specific industries, it is made as an open or hermetic type. The latter is used in chemical industries where explosion, fire, or pollution hazards exist. Results of successful tests are given.

22139

APTIC NO. 41914

Haas, L. A., T. H. McCormick, and S. E. Khalafalla

ACTIVITY PATTERNS IN THE CATALYTIC REDUCTION OF SO₂ ON SOME TRANSITION ELEMENTS IN ALUMINA. Bureau of Mines, Twin Cities, Minn., Twin Cities Metallurgy Research Center, Dept. of Investigations 7647, 16p., 1972. 40 refs.

Sulfur dioxide reduction with carbon monoxide was studied in an integral flow reactor at a nominal flow of 0.5 l/min. Reactant gas contained 3% SO₂, 6% CO, and the balance helium. Sulfur dioxide conversion was determined for three different

types of catalysts. The first consisted of 16 commercial catalysts used for various chemical syntheses. Only the commercial catalysts which contained transition metals in alumina removed more than 30% SO₂ at temperatures below 510 C. Two other types of catalysts were prepared in the laboratory either by pelletizing equal amounts of powdered alumina and transition metal oxides or by impregnating commercial alumina tablets with transition metal ions. Regardless of preparation techniques, chromium and iron in alumina were the two best catalysts. The observed results suggest that an intermediate (carbonyl sulfide) is formed by the interaction of surface metal sulfides and carbonyls. Alumina then catalyzes the interaction of SCO with SO₂ to form the end products (sulfur and carbon dioxide). Over 80% SO₂ was removed at 460 C with 2 g alumina impregnated with 2.5% iron. (Author abstract)

22140

APTIC NO. 41911

Hamblin, Robert J. J.

COMBINATION OF A HYDROCARBON CONVERSION PROCESS WITH A WATER TREATMENT PROCESS FOR RECOVERY OF AMMONIA AND SULFUR. (Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,627,470. 9p., Dec. 14, 1971. 6 refs. (Appl. Dec. 23, 1968, 10 claims).

A hydrocarbon charge stock containing sulfurous and nitrogenous contaminants is converted and elemental sulfur and an ammoniacal aqueous stream are simultaneously recovered by contacting the hydrocarbon charge stock and a hydrogen stream with a hydrocarbon conversion catalyst at conversion conditions sufficient to form an effluent stream containing substantially less sulfurous and nitrogenous contaminants, hydrocarbons, hydrogen, ammonia, and hydrogen sulfide. Then this effluent stream is mixed with a substantially thiosulfate-free recycle water stream recycle water stream containing ammonium hydroxide. The resulting mixture is cooled to produce a gas stream containing hydrogen and H₂S, a hydrocarbon stream and a water stream containing ammonium hydrosulfide. The H₂S is scrubbed from the gas stream with a recycle water stream containing NH₄OH and ammonium bisulfate to form a purified hydrogen stream and an aqueous bottom stream containing ammonium hydrosulfide and (NH₄)₂SS₂O₃. The water stream and the aqueous bottom stream are treated to produce elemental sulfur and an aqueous ammoniacal product stream and to form the recycle water streams.

22141

APTIC NO. 41118

Hardenberg, Horst

STUDIES OF THE DEVELOPMENT AND ELIMINATION OF FUEL SMOKE AND EXHAUST GAS ODOR.

(Untersuchungen zur Entstehung und Beseitigung von Kraftstoffrauch und Abgasgeruch). Text in German. Motortechnik. 2 (Stuttgart), 33(6):248-254, June 1972. 5 refs.

Two types of smoke must be distinguished: black smoke and white smoke. Black smoke consists primarily of soot and hexagonally structured polyaromatics. The polyaromatics attain a size of about one millimicron; the soot particles, a size of up to one micron. Black smoke is a combustion product which contains only unburned matter. White smoke is fuel in droplet form plus water mist which is a condensate and combustion product. On a four-stroke Otto engine, the emission of white smoke at various operating states was studied and the intensity of the exhaust gas odor determined. A modified Hartridge smoke measuring unit was used to measure white smoke through the extinction of a light beam passed through the waste gas. The odor intensity was determined with test persons. During non-stationary conditions or undercooling of the exhaust pipe, the unburned hydrocarbons reach measurable quantities and become visible in the form of fuel smoke. The development of this smoke can be avoided by increasing the engine temperatures and the temperature of the exhaust pipe and by external or internal mixture formation. The occurrence

of exhaust gas odors is indirectly related with the unburned hydrocarbons. Odorous substances seem to develop from them, both in the combustion chamber as well as in the exhaust pipe.

22142

APTIC NO. 41786

Harima, Mikio

RECENT STACK GAS ELIMINATION PROCESS (ELIMINATION OF H₂S AND SO₂) AND DESULFURIZATION. (Saikin no haigasu jokyō puroseshu (H₂S, SO₂ jokyō) to datsuryū). Text in Japanese. Kagaku Kogyo, 23(7):906-914, July 1972. 1 ref.

Sulfuric acid and caustic soda can be used for desulfurization during petroleum refining. Hydrogen sulfide can be eliminated from stack gas by wet methods such as the carbonic acid, Catacarb, Benfield, Alkazid, Scaboard, and Vacuum carbonate methods, using alkaline solutions; and by the Sulfinol, Selexol, Fluorine solvent, Purisol, and Rectisol methods using absorption. Direct methods include the Thylox, Ferrox, Peox, Lacy-Keller, molecular bed, dry bed, and Nalco. The wet lime gypsum, Wellman, Grillo, manganese dioxide, melting carbonate, ammonia, lime, and caustic soda methods for removing sulfur dioxide are also discussed.

22143

APTIC NO. 42178

Hasegawa, T., T. Ono, M. Koizumi, H. Mizuuchi, N. Takanari, T. Tanaka, and T. Ohtsuka

STUDY ON THE CATALYST FOR CRUDE OR RESIDUAL OIL HYDRODESULFURIZATION (PART I). DESULFURIZATION ACTIVITY OF MOLYBDENUM AND TUNGSTEN CATALYSTS. (Jushitsuyu datsuryū shokubai no kento (sono I), moribuden-kei oyobi tangusuten-kei shokubai no datsuryū kassei). Text in Japanese. Denryoku chuo Kenkyusho Gijyutsu Daiichi Kenkyujo Hokoku (Tech. Lab. Central Res. Inst. Electric Power Ind., Rept. 1971:1-17, Sept. 1971. 16 refs.

A small fixed catalyst reactor of flow method was used for the studies of catalytic activities of molybdenum, tungsten, vanadium, cobalt, nickel, iron, chromium, and uranium supported by alumina for the hydrodesulfurization of crude oil. Khaffji crude oil was used as the sample and the standard conditions of temperature at 410 C, pressure at 40 kg/sq cm G, liquid space velocity of 20/hr, and hydrogen and oil ratio of 500 by volume were adopted. The oil was supplied at 16 ml/hr. Results showed that, for a Mo-Co-alumina system at Mo/Co atomic ratio of three, 72% desulfurization was accomplished at 10% metal content, for a Mo-Ni-alumina system at Mo/Ni atomic ratio of two to six, high rates of desulfurization were obtained at ten to 20% metal content. The binary systems Mo-Cr and Mo-Fe were found to have larger effects on desulfurization than Mo alone, whereas Mo-U was almost the same as Mo. The W-Co-alumina system showed the highest rate of desulfurization at W/Co atomic ratio of one to seven and metal content of 15 to 25%. It was also shown that the prepared catalysts gave up to 10% higher sulfur removal than commercial catalysts of the same composition.

22144

APTIC NO. 41702

Hata, Yotaro

ENGINE EXHAUST GAS PURIFICATION DEVICE. (Enjin no haiku gasu chiri sochi). Text in Japanese. (Matsushita Seiko K. K. (Japan) Japan. Pat. Sho 47-2967. 2p., Feb. 1, 1972. (Appl. July 7, 1969, 1 claim).

The design and operation of an engine exhaust gas purifying apparatus are presented. The apparatus consists of water at the bottom of the container, a space above the water layer, and a filter layer. The gas introducing pipe is inserted down to the space layer. When gas enters through the pipe, it contacts with the water and the large particulates are precipitated into water. The gas containing smaller particulates then passes through the filter layer where the small particulates are

removed; the clean air leaves from the top of the container. The particulates adhering to the surface of the filter are washed by wind-agitated water, thus effectively preventing filter blocking.

22145

APTIC NO. 41540

Haver, F. P. and M. M. Wong

MAKING COPPER WITHOUT POLLUTION. *Mining Engineering*, 24(6):52-53, June 1972.

A proposed method for the treatment of copper concentrate appears to be well suited to a continuous operation on a large scale in locations having regulations controlling air and water pollution. Mixtures of copper concentrate and lime were brought to the ignition point, 400 C, and the reaction was allowed to proceed with no external heating. An amount of lime equivalent to the sulfur present in the concentrate is necessary to avoid air pollution. After 3 hr roasting, the mixture was leached with 20% hydrochloric acid. Under optimum conditions, the leach solution contained 99% of the copper, 96% of the molybdenum, and 87% of the iron present in the concentrate. Molybdenum was removed from the solution with activated carbon, and the copper was reduced with sponge iron. Hydrochloric acid was regenerated for further use, and iron oxide was a byproduct. The residue from roasting was 82% anhydrite from which gold was removed by cyanidization. The chief expenses in an industrial scale installation would be for lime, sponge iron, and HCl regeneration. The concentrate used in the test yielded cement copper, molybdenum trioxide, gold, silver, and ferric oxide plus an amount of calcium sulfate equivalent in weight to the concentrate treated.

22146

APTIC NO. 41736

Hayashi, Hiroshi and Iwao Nemoto

EXAMINATION OF CONDITIONS FOR CATALYST ACTIVITY TEST. (*Shokubai kassei shiken joken no kento*). Text in Japanese. In: *Studies on Automotive Exhaust Gas Detoxication*, June 1971, p. 56-69, 9 refs.

Tests for the experimental conditions of catalytic exhaust gas purification were conducted. The space velocity was determined by calculating the amount of exhaust gas at average speed of 36 km/hr and maximum speed at 91 km/hr. The amount of catalyst was determined by the swept volume of engine, engine output times 0.02, and engine output times 0.03. There was no remarkable change of temperature at the beginning and saturation of reaction for metal catalysts when space velocity was raised up to 30,000/hr. In contrast, metal oxide catalysts showed remarkable changes. Metal catalysts were not affected by the existence of steam, but metal oxide catalysts were temporarily poisoned by steam. The purification rate of the latter also decreased. Carbon dioxide delayed the reactions of both metal and metal oxide catalysts. However, the final rate of conversions were not affected. Increasing oxygen concentration in the secondary air decreased initiation temperature of both catalysts, but only decreased the saturation temperature of metal catalyst. The final rate of conversion of metal oxide catalyst was decreased by decreasing the carbon monoxide concentration.

22147

APTIC NO. 41711

Hayashi, Toshihiro

CRUDE OIL BOILERS ELECTROSTATIC PRECIPITATORS. (*Juyu sensho boirayo denki shujin sochi*). Text in Japanese. *Nenryo Oyobi Nensho (Fuel and Combustion)*, 39(5):455-469, May 1972.

An electrostatic precipitator for a boiler burning heavy oil is described in terms of principle, structure, and ash treatment. The conversion of sulfur dioxide to sulfur trioxide at the boiler exit depended largely on the oxygen concentration. Also, the higher the acid dew point, the higher the conversion rate. The amount of particulate from the boiler depended on operating and combustion conditions and was estimated at 0.1-0.3 g/N cu

m for a medium-size boiler with a capacity of 100-500 t/hr. Most of the particles were less than a few micron, and the average specific gravity was 1.8-2.0. The electrostatic precipitator collected particles as small as 0.001 micron. The principle was that by providing charge to the particles in the flue gas, the charge-bearing particles were easily separated from gases by the electrostatic force. The precipitator consisted of a dust collecting plate, a discharge pole, collecting plate beating equipment, discharge pole beating equipment, high-pressure insulating glass, a gas regulator, and a high-power electric source. Treatment of the collected particulates was by the dry vacuum suction method or hydraulic transportation.

22148

APTIC NO. 41200

Heek, Karl Heinrich van

GASIFICATION OF COAL IN THE USA (*Kohlenvergasung in den USA*). Glueckauf (Essen), 107(23):595-597, Nov. 1971. Translated from German. 10p.

Four processes have been developed in the U. S. for more efficient utilization of energy from coal and to reduce pollution: the synthane process, the bi-gas process, the carbon dioxide acceptor process, and the hy-gas process. In the first, coal is converted by autothermal gasification to synthesis gas from which methane is catalytically produced. The bi-gas process is characterized by the two-stage high pressure gasification of coal carried out in a single reaction vessel. In the lower stage a normal autothermal water vapor gasification with liquid draining of slag takes place. The coal is passed into the second stage and there reacts chiefly with the gas product produced in the first stage, that is, hydrogen and carbon monoxide. In the CO₂ acceptor process, calcined dolomite serves for heat transfer, thereby providing the advantage of additional heat formed in the reactor due to exothermic carbonate formation through the absorption of CO₂. In the hy-gas process the coal passes through an oxidation stage used for breaking down the caking properties. It is then ground and blended with light oils into a slurry which is fed into a high pressure reactor. There it passes through three stages: the light oil is distilled off and returned to the preparation of slurry; the volatile constituents and part of the coke are gasified by hydrogenation; and the balance of the coke is again partly converted to synthesis gas by water vapor gasification. The remaining residual is burned to generate steam and electricity. Flow diagrams and comparative data are presented for the four processes.

22149

APTIC NO. 42066

Helm, Edward J.

SYSTEM FOR COLLECTING DUST AND SMOKE WHEN COKE IS PUSHED FROM A COKE OVEN. (*Koppers Co. Inc., Pittsburgh, Pa.*) U. S. Pat. 3,647,636, 9p., March 7, 1972. 4 refs. (*Appl. Jan. 19, 1970, 13 claims*).

An apparatus is presented for collecting the dust and smoke which are generated when coke is being pushed from a coke oven chamber. A hood is movably mounted to a coke quenching car and cooperates with a coke guide that keeps the hood in place relative to the coke guide as the coke quenching car moves relative to the hood. Gas scrubbing equipment is associated with the coke guide and the hood to remove particulate matter from the gases collected in the hood. (Author abstract modified)

22150

APTIC NO. 42047

Henriksson, Sune Torsten, Ragnar Ludvig Muotka, and Lars E. Landeborg

APPARATUS FOR CATALYTIC CONVERSION OF EXHAUST GAS. (*Assignee not given*) U. S. Pat. 3,649,214, 5p., March 14, 1972. 7 refs. (*Appl. May 1, 1969, 7 claims*).

An apparatus is presented for catalytic conversion of exhaust gas from internal combustion engines. It comprises a casing

with a gas inlet and a gas outlet, as well as at least one container for catalytic material. The container has perforated walls and is disposed between the inlet and outlet openings. Each of the openings is connected to an exhaust gas system by means of a pair of opposing flanges. A sealing material is provided between the flanges and extends outward between one of the flanges and the edge portion of the wall. Tightening means are provided for pressing the flanges against the intermediate sealing material. The present apparatus avoids the leakage problems frequently encountered in previous exhaust converters. (Author abstract modified)

22151

APTIC NO. 41128

Higuchi, Fujitaro

AIR POLLUTION PREVENTION POLICY OF OUR NEW OSAKA PLANT. (*Tosha shin-Osaka kojo no taiko osei boshi taisaku*). Text in Japanese. *Osaka no Sora* (Sky Osaka), no. 14:19-23, March 1972.

The process of sugar manufacturing and the occurrences of air, noise, and water pollutions are shown in a flow sheet. Particulates are generated during the crystallization process, and smoke is produced whenever heat is supplied either to the manufacturing process or to the power systems. An electric dust collector is attached to the main boiler, and a jet scrubber to the charcoal regeneration furnace. Dust collectors are also attached to power sub-material supplier and the sieving and packing system. The main boiler is specialized for burning kerosene. The operation cost is slightly higher than that of burning heavy oil. However, when taking the pollution problem into account, burning kerosene is more desirable. The flue gas from the boiler having a capacity of 65 tons of steam/hr contains an average particulate concentration of 0.25 g/N cu m. An electro-static condensation-type dust collector used by this factory is described in detail.

22152

APTIC NO. 42127

Hill, David C.

EXHAUST GAS RECIRCULATION. (*General Motors Corp., Detroit, Mich.*) U. S. Pat. 3,641,989. 5p., Feb. 15, 1972. 5 refs. Appl. Nov. 16, 1970. 1 claim.

The formation of oxides of nitrogen in internal combustion engines and the subsequent emission of oxides of nitrogen in the engine exhaust gases may be reduced by recirculating a portion of the exhaust gases back through the engine induction passages to the combustion chambers. It is generally thought that exhaust gases should be recirculated at a rate proportional to the rate of induction air flow over the part throttle range of engine operation and, further, that recirculation of exhaust gases should be prevented during closed throttle, idling operation, and during wide open throttle, maximum power operation. Exhaust gas recirculation may be controlled by a diaphragm-operated valve responsive to induction vacuum signals sensed by a narrow, elongated slot traversed by the edge of the throttle. Earlier systems attempted to achieve this control by valves which were linked mechanically to the throttle or valves which were operated by a diaphragm responsive to induction vacuum signals such as those normally used to advance ignition timing. These systems were not completely satisfactory, in one case because of the complexity of the mechanical linkage required, and in the other case because the vacuum signals did not provide the desired variations in the control signal.

22153

APTIC NO. 41953

Hiramatsu, Tsuyoshh and Masayuki Morimoto

THE EFFECTS OF ADDITIVES ON SOOT CONTROL. (1). (*Baijin gensho no tame no tenkazai no koka* (1)). Text in Japanese. *Netsu kanri* (Heat Management: Energy and Pollution Control), 24(5):2-10, May 1972. 18 refs.

A basic anti-soot additive containing a complex of alkali, earth, metal, alkylbenzene sulfonate, and carbonates, and an

alkyl methylacrylate-dialkylaminoethyl methylacrylate copolymer was tested for its ability to reduce the soot in flue gases from a boiler stack, by adding 0.033% by volume into heavy oil. The determination of soot concentration was carried out at the lower, middle, and upper parts of the stack based on JIS Z8808 moving sampling method. Results from the tests of six boilers revealed that the soot concentrations were reduced by more than 50% after 11 hours, and all achieved the goal of 0.05 g/N cu m. Comparisons of soot concentrations without the addition of additive and after 30 hours of addition showed that the unburned material decreased from 76.56% to 24.34%. The two components of the additive are believed to have a synergistic effect on the promotion of combustion of the unburned material. The secondary pollution due to the additive was negligible.

22154

APTIC NO. 42184

Hishida, Kazuo

THE ACTUAL STATE OF AIR POLLUTION AND ITS CONTROL COUNTERMEASURE. (*Taiki osen no genjo to boshi taisaku*). Text in Japanese. *Oyo Butsuri* (Tokyo), 40(11):1174-1190, Nov. 1971. 22 refs.

Air pollution sources and mechanisms are reviewed graphically. The main sources of atmosphere contamination are stationary sources, e.g., industrial plants emitting waste materials and mobile sources, e.g., automobiles. The sulfur dioxide concentrations of many major cities in Japan measured in 1969 exceeded the standard limits. The counter plan for fixed source control was partly effected by using high quality fuel, controlling the burning process, and developing more efficient and simpler apparatus to gather cinders and to reject injurious contamination. In addition to these processes, improved dispersion techniques are needed. The main contamination materials from fixed sources are composed of sulfur oxides and nitrogen oxides. Controls for emissions and exhaust gases from mobile sources are more difficult to implement.

22155

APTIC NO. 41285

Hobohm, Hans-Georg

PRACTICAL EXPERIENCE AND MEASURES OF RATIONALIZATION IN CONNECTION WITH DUST CONTROL EQUIPMENT. (*Praktische Erfahrungen mit Entstaubungsanlagen und Rationalisierungsmassnahmen*). Text in German. *Giesereitechnik*, 15(8):254-257, Aug. 1969. (Presented at the Meeting on Dust Control, 2nd, Leipzig, East Germany, Nov. 9-10, 1969.)

Electric arc melting furnaces in steel foundries emit brown-colored fumes that carry metal oxide particles in a size range of 0.7-400 micron. The most modern method of dealing with these fumes is their evacuation through an exhaust pipeline which connects to an opening in the furnace cover. The hot fumes are drawn out of the furnace by a suction fan. In the first part of the pipeline the afterburning of gases by the admission of secondary air converts the substantial carbon monoxide content to carbon dioxide. The gases are then cooled in the pipeline and enter a sleeve-type polyester filter assembly for dust removal; the assembly is suitable for a maximum 140 C gas temperature. When working with the oxygen lance steel-making process, the development of noxious gases becomes even more intense. Considerable dust forms during removal of burned out lining material from furnace parts and ladles. To combat this as far as possible, the receptacles for the lining scrap are placed into covered pits below floor, using funnels for accepting the material and releasing it downward into the receptacle. The dust generated is kept largely below the floor and is sucked away from the pit to the filtering station. Vibrating grates are employed for removing sand from molding boxes. The box rests on the grate in an inverted position and is surrounded by a hood. The freed sand is sucked off from underneath the grate and is then separated, for instance in a wet cyclone.

22156

APTIC NO. 41079

Hoffmann, Alfred and Heinrich Klein

TORNADO-FLOW APPARATUS FOR SEPARATING PARTICULATE SUBSTANCE FROM GASES, PARTICULARLY ADHESIVE LIQUIDS FROM GASES. (Siemens A. C., Berlin (West Germany)) U. S. Pat. 3,641,743. 4p. Feb. 15, 1972. 7 refs. (Appl. March 11, 1969, 3 claims).

A tornado flow apparatus is described for separating adhesive liquids, such as paint sprays or other easily adhering substances, from gases. The apparatus comprises a cylindrical separator vessel with an axial clean gas outlet, a gas inlet duct coaxially opposite the outlet, and tangential gas inlets obliquely opposed to the flow direction of the inlet duct. Thus, a tornado flow is produced in the vessel which causes the particulate substance to be separated from the gas and carried outward into an annular interspace surrounding the axial inlet duct. Nozzle devices are provided for producing a veil of liquid in the tornado chamber or on the inner wall surface of the chamber. Preferably the devices comprise a spray nozzle coaxially mounted in the mouth of the inlet duct to produce a conical veil of liquid in the lower region of the vessel, and tangential nozzle means in the upper region of the vessel inject liquid to wet the inner wall of the vessel. (Author abstract modified)

22157

APTIC NO. ----

Hondius, H., P. Brus, and P. Wilgenhof

THE APPLICATION OF NATURAL GAS IN DUTCH TRADE. (Erdgasinsatz im holländischen Gewerbe). Text in German. Gas Wasserfach, Gas Erdgas (Munich), 113(3):109-120, March 1972. 19 refs. (Presented at the Gasfachliche Aussprachetagung, Aachen, West Germany, 1971.)

Natural gas in the Netherlands is used for heating greenhouses, for various drying processes, for thermal afterburning of industrial waste gases, and for cutting steel. The most frequently used thermal afterburning system operates with an American burner type Combustifume. The advantage of this system is that the oxygen of the waste gas is used as primary air for combustion of the natural gas. A good effect of the Combustifume system is achieved at a flow resistance of the waste gas above the burner of 15 to 40 mm water. A number of measurements for testing the efficiency of a Combustifume experimental plant which was fed with about 800 cu m/hr waste gas from a bakelite hardening plant were taken. The waste gas contained originally 4000 mg phenol/cu m and 50 to 70 ppm carbon monoxide (volume/volume). The entrance temperature of the uncleaned gas was 91 to 98 C; the oxygen content, 19.5% by volume. With an afterburning temperature of 500 C, the efficiency of phenol removal was 90% (referred to as free phenol); at 570 C, it was 96%; and at 780 C, the total phenol content was reduced to 1.6 mg/cu m. The measured CO quantity was 450 ppm v/v at 550 C and 90 ppm v/v at 780 C.

22158

APTIC NO. 41772

Huch, R.

EXPERIENCES WITH THE COMBAT OF ANNOYING ODORS. (Erfahrungen bei der Bekämpfung belästigender Gerüche). Text in German. Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no. 35:53-57, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Experience gained in the cleaning of waste air from by-product driers for starch production; in the elimination of odors emitted from a pommes-frites frying station and an animal breeding station; in the cleaning of waste air from cooking and from evaporating beer seasoning (Bierwürze); and finally in treating odorous manure with chemicals are discussed. The waste gas from by-product drying in starch production is composed of olefins, nitriles, isonitriles, fatty acids, esters, aromatics, and very few amines. The waste

gases were preliminarily cleaned in an experimental spray tower by means of condensation combined with droplet separation. After preheating, the waste gas was passed over a honeycomb catalyst of aluminum oxide with a 0.1% platinum coating. The operating temperature was more than 420 C. The system operated with an efficiency of 92 to 95%. The carbon concentration was reduced from initially 115 to 177 mg/cu m to 5 to 10 mg C/cu m. The vapors from the pommes-frites frying station were cleaned by condensation and subsequent scrubbing in a pressure jump separator (Drucksprungabscheider). The initial 360 mg C/cu m gas were reduced to about 50 mg C/cu m gas. The ozonization of the waste air from a poultry breeding station proved to be inefficient. The same negative result was achieved with UV-radiation. A 75% efficiency was achieved with condensation of the waste air from cooking and evaporation of beer spice in a packed tower and subsequent retention of the mist in a pressure jump separator. The total emission by the feces from a milk breeding station was reduced by 85% through 5 g potassium permanganate per one sq m sand spread with a thickness of 3 cm.

22159

APTIC NO. 41274

Huenigen, E. and I. Yaskulla

EMISSION OF HARMFUL SUBSTANCES IN TERMS OF CARBURETOR IDLING SPEED ADJUSTMENT WHEN TESTING AUTOMOBILES USING THE EUROPEAN DRIVING CYCLE. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizbeniye Zagryaz. Vozdukh Gorodakh Vykhopnymi Gazami Avtomob., Proc. Symp., 2nd, 1971. 3 refs. Translated from Russian. 10p.

Tests of various automobiles widely used in eastern Europe are described which show that adjustment of the idling speed of a carburetor type engine for minimum toxicity is the most economical way to reduce automotive air pollution. The maximum permissible value adopted by the Council for Mutual Economic Aid for the concentration of carbon monoxide in exhaust gases at idling speed is equal to 4.5% by volume. The idling speed adjustment instructions should include the use of a CO gas analyzer. Measurement of fuel consumption cannot be used by itself to obtain the most favorable idling speed adjustment, despite the fact that such measurement is cheaper than CO measurement. Exhaust gas CO content is a very sensitive index of optimal engine adjustment. This is particularly true in the region of low fuel consumption where a great change in CO takes place for a small change in fuel consumption. A linear relationship between fuel consumption and exhaust gas CO content at idling speed was found.

22160

APTIC NO. 41129

Hunt, Elton B., Jr., John W. Palm, and Neal Mitchell Caruthers

TREATING THE OUTFLOW OF SULFUR-PRODUCING EQUIPMENT TO RECOVER SULFUR AND PREVENT POLLUTION. (Verfahren zur Behandlung des Abstroms von Schwefelanlagen). Text in German. (Pan American Petroleum Corp., Tulsa, Okla.) W. Ger. Pat. Appl. 2,109,761. 19p., Feb. 25, 1971 (9 claims).

Gas containing hydrogen sulfide and sulfur dioxide, such as that from a furnace, is passed through three chambers, each provided with a bed of Claus catalyst for promoting the reaction between H₂S and SO₂. In the first or regeneration-production stage, the gas is at a temperature of 232-316 C; then the reaction occurs and the catalyst is regenerated. In the second or purification stage, the gas is at 93-204 C, the temperature at which the catalyst is most effective. In the third or cooling stage, the temperature is reduced so that the gas can be released to the atmosphere. A condenser between the first and second stages removes molten sulfur. Additional cooling may be provided between the second and third stages. The apparatus is provided with suitable piping and valves so that each of the three chambers becomes, in rotation, the first, second, and third stages.

22161

APTIC NO. 42299

Hunter, Wesley L.

PROCESS FOR THE REMOVAL AND CONCENTRATION OF A COMPONENT GAS FROM A MULTI-GASEOUS STREAM. (Ashland Oil, Inc., Houston, Tex.) U. S. Pat. 3,656,275. 5p., April 18, 1972. 4 refs. (Appl. Jan. 20, 1968, 8 claims).

A process is presented for recovering elemental sulfur from the acid gas effluent of an amine treating plant where the effluent comprises a very low percentage component of hydrogen sulfide and relatively high percentages of carbon dioxide, nitrogen, and hydrocarbons. The invention integrates the concentration and recovery operations so that all heating requirements of the concentration section are provided by a high pressure steam boiler in the recovery section. The high pressure boiler generates, as a by-product, heat which is carried back to a reboiler in the concentration section. A natural gas engine which drives the refrigeration compressor, air coolers, and related equipment in the concentration section also drives the steam condenser and cooler fans serving the recovery section. The system is completely closed, with only makeup water being required to replace leakage in the steam section. The process which is described may be applied readily to other vent streams, such as for the removal of carbon dioxide to produce caustic soda. The system is of the regenerative liquid solvent type using an absorber tower and subsequent solvent fractionator. In the case of hydrogen sulfide, the solvent used is preferably N-methyl-2-pyrrolidone which, when saturated, is passed to the fractionator column where the hydrogen sulfide is released due to a controlled increase in temperature and reduction in pressure. The hydrogen sulfide is then passed to a separator where free water in the acid stream is accumulated and after which the concentrated hydrogen sulfide is passed to a boiler. There, a portion of the hydrogen sulfide is burned to sulfur dioxide under controlled conditions. The SO₂ and remaining H₂S are then combined in the presence of a catalyst and chemically reacted to produce water and commercially high grade elemental sulfur. (Author abstract modified)

22162

APTIC NO. 41447

Ievlev, V. V., V. I. Litvinenko, and S. N. Lazorenko

SULPHUR LOSSES IN SULPHUR REMOVAL PLANTS. *Coke Chem. (USSR)* (English translation from Russian of: *Koks i Khim.*), no. 10:49-51, 1971. 5 refs.

Both the arsenic-soda process and the vacuum-carbonate process to extract hydrogen sulfide from coke-oven gas need further development to reduce the level of air and water pollution produced and increase the output of sulfur and sulfuric acid. The liquid effluent produced by an arsenic soda plant is rich in sulfur containing sodium salts and is reused in the quenching of coke. The coke thus produced is enriched in sulfur 0.1% and enriched in ash 0.4%. In the arsenic-soda process, 9000 t of sulfur and 31,000 t of sodium thiosulfate, sulfate, and thiocyanate are lost annually. Equipment to reclaim these saleable compounds from salts in the effluent would also increase the value of the coke by reducing the sulfur and fly ash content. In the vacuum-carbonate process, SO₂ and SO₃ loss is mainly due to inefficient oxidation in the wet catalytic plant. Improved catalytic oxidation, more intense spray irrigation in the condensation towers, and improved electrostatic precipitators are needed.

22163

APTIC NO. 42087

Ikemori, K.

DUST COLLECTION DEVICE PERFORMANCE CAPACITY. (*Shujin sochi no hoshuseino-ron*). Text in Japanese. *Kuki Seijo* (Clean Air-Japan Air Cleaning Assoc., Tokyo), 10(1):5-19, April 1972.

From the point of view of air pollution and environmental protection, the evaluation of the dust collectors should depend on the concentration of gas which discharges from the devices.

However, usually the evaluation for the capacity of the dust collectors seems to depend on the dust collection rate. Cyclones and scrubbers are discussed. The Multi-Tubular Dust Collector has an outer drum diameter of 150-300 m. The dust collection rates for Tubix type K, type B, type M, and type TDF collectors are 95%, 92.5%, 92.5%, and 87% respectively. Packed towers and venturi scrubbers are important devices. The calculations of total dust collection rate derived from partial dust collection rate were obtained.

22164

APTIC NO. 41549

Imamura, Sadao

DEODORIZATION BY HIGH TEMPERATURE COMBUSTION (COLPACK DIRECT FLAME DEODORIZATION SYSTEM). (*Koon nensho ni yoru dasshu (koru pakku chokuenshiki dasshu shisutemu)*). Text in Japanese. *Kagaku Kojo* (Chem. Factory), 16(5):41-46, May 1972. 3 refs.

A general discussion on the C5olpack direct flame deodorizing system and the result of an operating example are given. A luminous flame, generated by burning gas or liquid fuel, is used to decompose the odorous gas. Flue gas, after deodorization, is introduced into a heat exchanger where the odorous gas is preheated. A flow sheet is shown in which 99.99% of the odorous compounds, such as phenol, formalin, toluene, methanol, and other organic solvents, were removed. The fuel required was lowered to one sixth of the theoretical amount by increasing the heat exchange efficiency. The machine is automatically operated, and the other conditions are: dust concentration in stack, 0.07 g/N cu m; odorous gas, 360 cu m/min; combustion temperature, 760 C; and heat recovery 1,800,000 kcal/hr.

22165

APTIC NO. 41041

Ishihara, Shin-ya

PREVENTIVE MEASURES OF AIR POLLUTION BY EXHAUST GAS AND ELECTRIC APPLIANCES. (*Haiki kogai taisaku to densohin*). Text in Japanese. *Jidosha Gijutsu* (Automobile Eng.), 25(11):1154-1157, Nov. 1971.

The engine modifications designed for exports are reviewed. In addition to improvements made on various parts of engine, the throttle positioner system, spark timing correctional system, gasoline evaporation control system, and the overall system were improved, and the mechanism and principles are explained with diagrams. The ignition timing correction system controls the amount of nitrogen oxides emitted from the engine, utilizing the principle that the amount of NO_x decreases when the maximum temperature lowers and by delaying ignition time. Its operational range must be within a 50 km/hr speed, and the temperature of the cooling water must be between 50 and 100 C. Hydrocarbons which are contained in gasoline, are controlled by sending the evaporated gasoline from the gasoline tank to a canister packed with activated carbon or in the crank room of the engine. It is purged by fresh air and led to cylinders for combustion. The purge condition is controlled by throttle positioner system signals. Air injection system, engine modifications, manifold reactor system, catalytic converter system, afterburner system, and exhaust recirculation systems are discussed.

22166

APTIC NO. 42027

Ishizaki, Katsusuke and Teruo Ohki

OPERATING RESULTS OF EXHAUST GAS DESULFURIZATION PLANT AT NIPPON KOKAN'S FERTILIZER DIVISION (KOYASU WORKS). (*Nihon Kokan (Kabu) hiryobu (Koyasu kojo) ni okeru haen datsuryu no sogyo jisseki*). Text in Japanese. *Nenryo Kyokaiishi* (J. Fuel Soc. Japan, Tokyo), 51(542):354-359, June 1972.

Exhaust gas from the Lurgi type contact sulfuric acid plant is treated by a desulfurizing plant based on the lime-gypsum

process in the Koyasu Works, Fertilizer Division, Nippon, Kokan. The exhaust gas, discharged in an amount of approximately 60,000 cu Nm/hr contains sulfur oxides consisting of 2000-3000 ppm of sulfur dioxide and about 400 ppm of sulfur trioxide, which decreases to less than 300 ppm after treatment. This exhaust gas desulfurizer converts SO₂, absorbed by lime milk, into calcium sulfite and obtains high quality gypsum through air oxidation. Initial difficulties in operation caused by trouble in treating the slurry were solved by modifications and improvements made in the plant and the operating practices. Further improvements in facilities and automation have been made in an attempt to save labor. With a view to developing the exhaust gas desulfurization process applicable to ordinary emissions, a pilot plant of 2000 cu Nm/hr based on the use of boiler exhaust gas was constructed in the Koyasu works with reference to the exhaust gas desulfurizing technique and the experience acquired in operating this sulfuric acid plant. Experiments were carried out, and the results permitted establishment of an exhaust gas desulfurizing technique applicable to ordinary exhaust gas. (Author summary modified)

22167

APTIC NO. 42297

Ito, Mikiji, Kenji Yamada, and Kazuo Noda

EXHAUST EMISSION PURIFYING DEVICE. (Nippon Denso K. K., Kariya, Aichi (Japan)) U. S. Pat. 3,654,763. 7p., April 11, 1972. 7 refs. (Appl. April 23, 1970, 11 claims).

A very useful exhaust emission purifying device is described which comprises an air pump driven from the engine for discharging air into a portion adjacent to the exhaust valve of each cylinder to effect an oxidizing reaction with hot exhaust gases. At least one spark plug is provided in the manifold portion of the device to immediately burn a good mixture of air and highly dense unburned exhaust gases resulting from the misfiring caused during the deceleration of the engine. The quantity of air required to purify the exhaust gases can be reduced, and the unburned gases ready to be burned are prevented from accumulating in any portion subsequent to the manifold portion, thereby obviating the occurrence of afterburn noises. The present invention reduces the size of the air pump as well as the power consumption of the engine. Previous devices required excessive air supplies and equipment arrangements which acted to deteriorate engine performance. (Author abstract modified)

22168

APTIC NO. 41126

Ito, Shoji

THE PRESENT AND FUTURE TRENDS OF DUST COLLECTION TECHNIQUE. (Shujin gijutsu no genkyo to shorai no doko). Text in Japanese. Osaka no Sora (Sky Osaka), no. 14:9-10, March 1972.

In recent years, the standard concentration of dust in flue gas was revised from 0.5 g/n cu m to 0.1 0.05 g/n cu m. Therefore, dust collectors with higher collection efficiency were demanded. Major factors for the selection of dust collector are the conditions of dust and gas, pollution, cost, and maintenance. Bag filters and dry cotrells are generally used in dry collection. Bag filters usually have less stable pressure loss, and therefore, are used for smaller scale collection, whereas dry cotrells have more stable pressure loss and are used for larger scale collection. Secondary pollution due to waste water always occurs when a wet-type collector is used; therefore, equipment for water treatment is needed. Major points for the improvement and development of the machines were also mentioned.

22169

APTIC NO. 42105

Jaffe, Joseph and James R. Kittrell

CATALYST COMPRISING A FLUORINE-CONTAINING LAYERED CRYSTALLINE ALUMINOSILICATE, AND PREPARATION AND USE THEREOF. (Chevron Research Co., San Francisco, Calif.) U. S. Pat. 3,639,268. 5p., Feb. 1, 1972. 6 refs. (Appl. Aug. 21, 1968, 10 claims).

A hydrotreating catalyst is described which comprises fluorine-containing layered crystalline aluminosilicate particles in a matrix having at least one solid oxide and at least one hydrogenating component. The hydrogenating component is selected from Group VI metals, such as tungsten and molybdenum and Group VII metals such as nickel and cobalt, and their compounds. Preparation and uses of the catalyst are indicated. (Author abstract modified)

22170

APTIC NO. 41144

James, D. E.

A BOILER MANUFACTURER'S VIEW ON NITRIC OXIDE FORMATION. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1970. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Calif., Oct. 1970.)

The formation of nitric oxide in utility boilers, controls to minimize NO formation in existing units, and plans for the future to reduce the NO emission levels below those attainable today were discussed. In a boiler furnace, as the oxygen concentration in the combustion products or combustion temperature is increased, the amount and rate of NO formation increases. As the time available for reaction at a high temperature increases, the NO concentration also increases. If the flue gas is cooled rapidly, the NO formed at higher temperatures will not decompose. Five methods were presented for the reduction of NO formation. They include modification of the burning equipment so that the fuel and the air mix at a slower rate, lowering the temperature of the combustion air, a two-stage combustion process, reduction of combustion gas temperature by diverting a portion of cool flue gas, and application of all four methods together.

22171

APTIC NO. 41917

Jaros, Stanislav

FUEL CONSUMPTION IN CATALYTIC REDUCTION OF NITROGEN OXIDES RESULTING FROM THE NITRIC ACID PRODUCTION. (Spotřeba paliva pro katalytickou redukci kyslíčnicku dusíku z výroby kyseliny dusíčné). Text in Czech. Chem. Průmysl (Prague), 22(5):227-230, 1972. 2 refs.

On the basis of the thermal conditions necessary for the run of the catalytic reactor it is possible to determine in advance the necessary amount of oxygen in the final gases leaving the absorption unit. According to the amount of oxygen and of nitrogen oxides in the gas and to its flow rate, the theoretical consumption of the reducing gas is calculated. For a quick determination it is possible to construct a nomograph. The nomographs presented have been constructed for use with the new Czechoslovak production unit Ch 200, but they can be simply modified for use with nitric acid producing units having other production ranges. 0

22172

APTIC NO. 41060

Jefferies, Roger A.

HOW TO CLEAN YOUR FACTORY AIR. Food Mfr., 47(5):41-44, May 1972.

To meet the demands for air cleaning in the food industry, the number of air changes in any working area must be much greater than those normally associated with natural ventilation. Consequently, the quantity of atmospheric contaminants introduced is greatly increased. The basic collection of 5 micron dust can be achieved by a number of methods utilizing differing media. Regenerable filters may take the form of a viscous coated panel, normally of metal construction where the filtering surface is coated with a viscous substance such as oil. Other main types of regenerable filters are those in which the filter medium, which is normally used dry, may be washed when fully loaded with dust. These can be either reticulated foam or fibrous mat types. The second main category of filters, disposable filter cells, includes roll filters, disposable panel filters, and extended surface filters. High efficiency par-

ticulate air filters, generally constructed of pleated glass paper, are used in areas where very clean-to-sterile conditions are essential. Filter efficiency determination methods are discussed.

22173

APTIC NO. 41747

Jo, Souk Hong and Tadashi Ayusawa

ON THE EXHAUST EMISSIONS OF VARIOUS AUTOMOBILE ENGINES AND THEIR CONTROL SYSTEMS. NO. 2. (*Kakushu nainen kikan no haiki gasu to mugaika shori no hoho*). Text in Japanese. *Nihon Jidosha Kenkyusho Hojo Jigyo Hokokusho*. (Japan Auto. Res. Inst. Rep. Subsidized Res. Proj.) 1971:7-20, June 1971.

Exhaust gas compositions of three gasoline engines and one diesel engine are shown. For a four-cycle gasoline engine, oxygen remained almost constant at 0.4% at an air-fuel ratio under theoretical value, and high hydrocarbon and oxygen were found at engine brake time. A two-cycle gasoline engine had more O₂ but lower nitrogen oxides compared to its four-cycle counterpart. A rotary gasoline engine had higher hydrocarbon and O₂ values, while the nitrogen oxides were between that of the two-cycle and the four-cycle engine. A four cylinder 2000 cu cm diesel engine showed a large amount of O₂ but a very small amount of HC and carbon monoxide. Methods for the control of the individual component are tabulated. It is important that effective control systems be developed for various engines by combining the above methods. Five projects were planned and studied by the Japan Automobile Research Institute. A simulation of the control system for exhaust gas was carried out. The heat evolution from the NO_x reduction layer was small and so was the temperature increase of the exhaust gas. The supply of HC was necessary at high air-fuel ratios, especially from about 13.5, at which the amount of NO_x increased remarkably. However, the absolute amount was small at .01 g/s for n-hexane. The amount of air supplied should be 4% to 30% of that of the exhaust gas. Attention should be paid to the heat evolution of the HC and CO oxidation layer, which increased significantly due to different conditions. Flame and catalytic afterburners, a particulate eliminator and other control systems are mentioned.

22174

APTIC NO. 41708

Johnson, A. R., R. H. Wolk, R. F. Hippeli, and G. Nongbri

DESULFURIZATION REACTORS ADDED TO H-OIL PROCESS. *Oil Gas J.*, 70(23):59-62, June 5, 1972, 5 refs. (Presented at the National Petroleum Refiners Association, Annual Meeting, San Antonio, Tex., March 26-28, 1972.)

Reactors added in the H-Oil process now make it possible to design a processing facility to economically produce fuel oils of 0.3% sulfur content from a broad range of feedstocks. A demetallization step which removes organometallic compounds from fuel oils involves an additional reactor and a low-cost solid material which is continuously added and discarded in the patented ebullated-bed system. This processing step is then followed by H-Oil desulfurization where purified oil flows to one or more additional reactors using conventional catalyst. The reaction mechanism, catalyst aging, the effect of hydrogen sulfide, reactor staging, split hydrogen recycle, demetallization, new catalysts, the multipurpose plant, and future application are considered.

22175

APTIC NO. 41788

Kan, Masanao

RESPECT FOR HUMAN WELFARE AND MANAGEMENT POLICY TOWARD NON-POLLUTION. (*Ningen soncho to mukogai o mezasu keiei rinen*). Text in Japanese. *Puranto Enjinia* (Plant Eng.), 4(1):61-69, Jan. 1972.

The Tokyo Electric Power Co. produces smoke, dust, nitrogen dioxide, sulfur oxides, and other pollutants. The Japanese pol-

lution control regulation was amended in 1970, making smoke, dust, automobile exhausts, fluorine, chlorine, cadmium, and lead subject to control. Therefore, the company increased its pollution control program. Low sulfur fuels and desulfurization are used to control sulfur oxide pollution. Liquefied natural gas is used as a fuel. Stacks 230 and 200 m high are used to help disperse the stack gases.

22176

APTIC NO. 42116

Karp, I. N., V. N. Gusev, and E. P. Chertopalov

COMBUSTION CHAMBER FOR BURNING HARMFUL IMPURITIES OF REGENERATOR GAS FROM MONOETHANOLAMINE PURIFICATION IN AN OXYGEN-GAS FLAME FOR THE PRODUCTION OF COMMERCIAL CARBON DIOXIDE. (*Kamera sporaniya dlya szhiganiya vrednykh primesey regeneratornogo gaza monoetanolinovoy ochistki v gaokislodnom fiale s tsel'shchyu polucheniya tovarnoy uglekisloty*). Text in Russian. *Khim. Tekhnol.*, no. 2:25-27, 1971.

A monoethanolamine-stripped coke oven regenerator gas containing 6% hydrogen sulfide and 400 mg/cu m of organic sulfur was converted in a combustion chamber into a carbonic acid product suitable for human consumption. The combustion products, formed at a regenerator gas flow rate of 100 to 200 cu m/hr, contained 91 to 92 mg/cu m carbon dioxide and sulfur dioxide; 4.5 to 5 mg/cu m oxygen; 3.5 to 4 mg/cu m nitrogen; 0.001 to 0.0015 mg/cu m hydrogen; and 2 to 5.1 mg/cu m organics.

22177

APTIC NO. 41912

Katatae, Shin and Masaharu Tsuda

MULTI-CYLINDER ENGINE EXHAUST GAS PURIFICATION SYSTEM. (*Takito enjin no haiki gasu joka sochi*). Text in Japanese. *Japan. Pat. Sho* 47-2965, 2p., Feb. 1, 1972. (Appl. June 10, 1969, 1 claim).

This invention relates to a compact exhaust gas purification system for a multicylinder engine. An air path is connected to every exhaust gas path of the cylinders and to the air pump as well. As a result, the number of pipes in the engine casing is minimized, and the manufacturing becomes simpler. Sleeves are attached to exhaust gas paths and the air that passes outside the sleeves for recombustion of exhaust gas is preheated. The sleeves also act as insulators for preventing heat loss from exhaust gas to the engine casing, thus increasing the efficiency of recombustion. An example is given using fresh air for the purpose of recombustion. However, other gas can also be used for the same purpose.

22178

APTIC NO. 40962

Katz, Norman

CLEANING POLLUTANTS FROM FURNACE AND INCINERATOR SMOKE AND THE LIKE. (*Assignee not given*). U. S. Pat. 3,640,054, 5p., Feb. 8, 1972, 10 refs. (Appl. April 17, 1970, 12 claims).

Numerous and varied schemes have been suggested for smoke abatement with varying degrees of success. Such disadvantages as complexity of most prior arrangements or systems, high installation and operating costs, and other inherent deficiencies have mitigated against their adoption even though proliferation of smoke-emitting units has continued with industrial and population expansion. A means for cleaning furnace and incinerator smoke is described which comprises conducting the gas through a cleaning zone of substantial length defined by an encompassing wall from which a washing liquid is sprayed to form a dense shower.

22179

APTIC NO. 42059

Kikuchi, Eiichi and Shigeru Yanagihara

MEASURES TO COUNTER FOR TRAFFIC ACCIDENTS AND AIR-POLLUTION IN CITIES. (*Kotsu anzen taisaku to kotsu kagai taisaku*). Text in Japanese. *Nippon*

Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers)(Tokyo), 75(640):782-788, May 1972. 3 refs.

Automobile exhaust control techniques being developed in the United States are reviewed. Presently developed exhaust gas cleaning techniques are mainly engine modification and air injection control. In the future, the adjustment of air-fuel ratio, even distribution of air-fuel mixture, a powerful ignition, and the exhaust control at the time of low speed driving will become more important. Samples of newly developed blowby control devices, electronically controlled fuel injection systems, and an improved engine are explained by illustrations and a diagram. Delayed ignition is very effective for controlling nitric oxide or hydrocarbons, although the degree of delay depends on such factors as the suction minus pressure, engine temperature, speed change gear position, and driving speed. For future exhaust control, thermal reactors and oxidation catalysts have some possibilities for controlling carbon monoxide and HC, and emission recycling and reduction catalysts for controlling nitrogen oxides. The thermal reactor is already used in rotary engines, and it is very effective for reduction of hydrocarbons. A considerable amount of oxidation of CO and HC can be achieved between 300 and 700 C, though it can react at 200 C. The problems of diesel engines, and the future development of gas turbines, steam engines, sterling engines, and electric cars are briefly mentioned.

22180

APTIC NO. 41065

Kim, V. P., V. A. Zhilin, and A. A. Botsman

CARBON DISULFIDE-RECALIM PILOT PLANT. (O rabote opytno-promyshlennoy ustanovki rekuperatsii serougleroda). Text in Russian. Khim. Volokna, no. 5:66-68, 1971. 3 refs.

A pilot plant designed to remove carbon disulfide and hydrogen sulfide and to reclaim CS₂ from vapor-gas-air mixtures in synthetic fiber processing plants is described. The gas exhausted from the hermetically closed spinning nests on the centrifuges is led to a scrubber containing cooled sodium hydroxide solution. The flow rate in the scrubber is 1-1.5 m/sec. The entire H₂S (original concentration 0.04 g/cu m) is absorbed in the scrubber, and the gas is then led into one of two adsorbers containing activated carbon to reduce the CS₂ content from 1.5-2 g/cu m to 0.1 g/cu m at a gas flow rate of 0.27-0.35 m/sec. The desorption is made in a third adsorber by means of vapor of 120 C. The residue passes a cooler, a phase separator, and another separator for the separation of the CS₂ from the water, while the non condensed CS₂ is recirculated to the adsorber. With a capacity of 16-18,000 cu m/hr, some 600 kg CS₂ are recycled daily to the production. An automatic process control system with computerized program and correction was developed for the CS₂-reclaim plant.

22181

APTIC NO. 41966

Kittrell, James R. and Richard C. Robinson

CATALYTIC HYDROGENATION OF AROMATICS WITH METAL PHOSPHATE-CONTAINING CATALYSTS. (Chevron Research Co., San Francisco, Calif. U. S. Pat. 3,627,672. Sp., Dec. 14, 1971. 5 refs. (Appl. Sept. 29, 1969, 3 claims).

Catalysts having particle density greater than 1.4 and containing alumina, phosphoric anhydride nickel, cobalt, molybdenum, titanium phosphate, and zirconium phosphate have high aromatic hydrogenation activity and prove tolerant to sulfur and nitrogen. The catalysts were prepared in five blending ratios: Ni or Co, generally in oxide form 1 to 10%; Mo, generally as molybdenum oxide, 5 to 25%; titanium or zirconium oxides, 5 to 20%; P₂O₅, 3 to 15%; Al₂O₃, at least 20%; and clay and/or zeolite, 0 to 20%. Mixtures were prepared by impregnating clay with aqueous solutions containing the appropriate metal salts, drying the product thoroughly, and calcining with high rates of dry air. The hydrogenation of aromatic hydrocarbons results in improved burning characteristics of many fuels. 0

48

22182

APTIC NO. 40977

Klimecek, Rostislav, Zdenek Krivsky, and Vladimir Veverka
ABSORBER PACKED WITH ORIENTATED HELICES.
Brit. Chem. Eng. Proc. Tech., 16(11):1018-1020, Nov. 1971. 4 refs.

Results and experiences obtained over several years of operation of absorbers packed with mounted wire helices made of various materials are reported. Heat and mass transfer between the phases occurs as a gas stream contacts a thin film of liquid flowing downwards over the vertically mounted helices. The helices are 0.6 to 1.0 m long and they are made of a wire whose diameter is about 3 mm. The thread diameter is 26 to 36 mm and there are about 90 threads/m of the helix length. Helices made of glass, aluminum, and polyene coated iron wire have proved usable and for each there are areas where it may be applied most advantageously. The upper part of a tower with helical packing acts as a carryover separator. It is filled with several layers of helical packing cells, which are not scrubbed under normal operation conditions. A liquid distributor is placed above this packing section in order to secure intermittent rinsing of the helices. The main body of the helical packing is built in the lower part of the absorption tower. The scrubbing liquid is distributed over the packing from a distributor placed closely above the top layer cells. Studies on the effects of pressure drop and height of transfer unit on the operation of the helical packing column are described. This column can be used for desulfurization, sulfuric acid removal, or other flue gas removal.

22183

APTIC NO. 42177

Knop, Wilhelm

EMISSION PROBLEMS IN GLUE AND GELATIN PLANTS AS WELL AS IN FLAYING STATIONS. (Emissionsprobleme in Leim- und Gelatine-fabriken sowie in Tierkoerperbeseitigungsanstalten). Text in German. Wasser Luft Betrieb, 16(6):190-192, June 1972. 12 refs.

In glue and gelatin producing plants (odorous substances are emitted by the storage stations and the degreasing apparatus which must be periodically opened. Annoying odors develop also during the production of bone meal. During the treatment of fat and skin more or less strongly oxidizing fatty acids develop. In animal flaying stations, odors are emitted during depressurizing of the pressure cookers, during charging and emptying of the cookers, and during drying. Moreover, odors are emitted by the condensation water and by the fat pressing chamber. The odors which develop during storage can be avoided by immediate processing of the raw material. Any emission of odors from operating rooms is avoided by maintaining a slight underpressure in them and by drawing off the odorous air right at the point of origin. For reduction of the odors developing in flaying houses, injection or surface condensation is mostly used. The direct injection of water cannot be used in all cases because the air pollution problem would be turned into a water pollution problem. The condensate must be treated with the other waste water. Surface condensation has the advantage of requiring very little fresh water. If scrubbers are used for odors removal, chlorine or chlorine dioxide must be used as oxidants. Another suitable method for deodorizing the waste air is the thermal afterburning at 800 C. Catalytic afterburning achieves a similar efficiency and is less costly. 0

22184

APTIC NO. 41568

Knopf, Hans

APPARATUS FOR REGENERATING THE OUTGOING AIR OF DRY-CLEANING MACHINES. (Verfahren und Vorrichtung zum Regenerieren der Abluft von Trockenreinigungsmaschinen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,011,300. 11p., Nov. 25, 1971. (Appl. March 10, 1970, 7 claims).

The air from dry-cleaning machines, containing azeotropic mixtures of steam and solvent vapors (trichloroethylene or

perchloroethylene), is passed through a condenser before it is filtered through a charcoal filter. Nearly quantitative condensation of the solvent vapors is reached in the condenser which is enclosed by a cooling jacket. The pipe from the dry-cleaning machine is submerged into a liquid contained in the above condenser, and thus the condensation is made by both liquid pressure and intense cooling. The cooling liquid may be water at a temperature below 20°C. The rest of the solvent vapors is adsorbed by the charcoal filter following the condenser. The above device, providing nearly total solvent recovery and considerably extended regeneration intervals for the charcoal filter, can be incorporated in the dry-cleaning machine.

22185

APTIC NO. 42085

Kobayakawa, Tetsuma

TCC FLUE GAS TREATMENT SYSTEM. (*TCC heigasu shori sochi*). Text in Japanese. Sangyo Kikai (Ind. Machinery), no. 258:50-52, March 1972.

The Tokyo Rayon Engineering Co. completed a flue gas treatment system which uses centrifugal force. This system is compact and highly efficient. It contributes not only desulfurization, removing the waste gas and odor, but also gives a chemical reaction during the production processes. The gas goes through the rotor which is porous, and is discharged through the fan. The solution is emitted through a multiple number of holes in the rotor by centrifugal force. Thus, solution and gas make cross contact. Then the solution goes to the circulation tank. The important characteristics of this system are as follows: a large gas absorption rate, no over-flowing, no mist, less damage from pressure, and movable size.

22186

APTIC NO. 41504

Konno, N., N. Yamamoto, A. Watanabe, and S. Yanagisawa

EFFECTIVENESS OF SULFUR OXIDES COLLECTION METHODS. (*do sankabutsu no hoshu koritsu*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):26, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Experiments were conducted in order to collect sulfur trioxide which is difficult to capture due to its sulfuric acid mist. Using the Japanese Industrial Standard method of a glass filter absorption tube and a hydrogen peroxide 3% solution, sulfur dioxide 1800 ppm concentration was absorbed, and the absorption rate was obtained. In all cases, 100% collection rate was obtained. When sulfur trioxide was absorbed under the same condition, the rate fluctuated from 90 to 98%, and reliability was poor. A static electric aerosol device was made and mist was created by high voltage. As an absorbent, a 3% hydrogen peroxide solution mixed with a small amount of isopropanol was used, and a test gas with 1800 ppm SO₂ was passed through the equipment. Mist and SO₂ gas were captured at the rate of 94%. Then, a mixture of an interface activated solution and alcohol was used as an absorbent, and the sulfuric acid aerosol was captured. Sulfuric acid ion was measured and it was confirmed that more than 99.5% of SO₃ of 100 to 700 ppm concentration was captured. An electrostatic precipitator was also used as another method. First absorption tube was used, and the aerosol form of SO₃ was captured by Cottrell, then the remainder was captured by a liquid air trap. This method assured a complete capture of SO₃.

22187

APTIC NO. 41713

Koumi, Hideo

DRY-TYPE DUST COLLECTION SYSTEM. (*Kanshiki shujin sochi ni tsuite*). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(3):488-494, May 1972.

Three types of dry dust collectors, and the selection and plan of a dust collection system are described with examples. The cyclone is the most frequently used centrifugal dust collector. The principle is that dust-containing gases are circulated in the cyclone and the dust is separated by centrifugal force. This

machine has a low construction cost but high pressure loss. At a gas supply rate of 18 m/s, the pressure loss is about 150 mm H₂O at room temperature and 70-80 mm H₂O at 300°C. The most common filtering dust collector is the bag filter in which dust-containing gases are passed through a filter cloth made of fiber and the dust is collected. Small particles can be collected at low gas flow rate. The optimum flow rate is 0.5-1.0 cu m/sq m/min. The most common dust collector is the electrostatic precipitator. The principle is that the particles are charged by utilizing corona discharge and collected with electrostatic force. An electrostatic precipitator has high collection efficiency and low pressure loss. However, the cost is high. Factors to be considered when selecting a dust collector are the property of dust, temperature of the treated gas, dust concentration, and cost. Plans for dust collection from boilers burning heavy oil and wood, respectively, are given as examples.

22188

APTIC NO. 42060

Koyama, Yoshimasa

DEODORIZATION APPARATUS FOR COUNTERACTION OF INDUSTRIAL ODORS. (*Sangyoyo akushu chuwa dasshu sochi ni tsuite*). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(10):984-994, 1971. 9 refs.

Ninety percent desulfurization of hydrogen sulfide does not eliminate the odor of H₂S, 0.1 ppm of which creates enough odor to annoy. Ten ppm of H₂S is just as strong as 100 ppm. The principle of counteracting odor is explained, provided that the theory that odor is a vibration of certain elements is correct. Counteracting of odor does not eliminate the odor-creating gas itself. Apparently, odor is an element emitted by volatile material and stimulates the sense of odor in the human nose. The vibration of a neutralizer and the odor-creating element counteract each other. Masking principles are completely different, and as a major example, an airwick is discussed at length. Various data on airwicks, various types and their effects, types of odor and appropriate airwick formula numbers, airwick atomizer deodorizers, and the OMK deodorizer system are explained with illustrations. An application of the OMK system to a sewage treatment plant is explained with a flow sheet. The system comprises a water pump, a water scrubbing tank, a compression tank, an air compressor, an airwick tank, and an airwick drum.

22189

APTIC NO. 40956

Kraus, Bernhard J. and Dae Sik Kim

LOW-POLLUTING INTERNAL COMBUSTION ENGINE WHEREIN SECONDARY AIR IS UTILIZED TO PREVENT OVERHEATING OF THE EXHAUST MANIFOLD. (*Esso Research and Engineering Co., Linden, N. J.*) U. S. Pat. 3,641,767. 4p., Feb. 15, 1972. 3 refs. (Appl. Feb. 12, 1970, 5 claims).

A low-polluting internal combustion engine is described wherein means are provided to inject secondary air in a pulsed manner to the exhaust ports of the cylinders when these ports are open to permit the ejection of exhaust gases. Particular features comprise controlling these pulses with respect to the shape, duration, and timing of the pulse with the cycle of the engine. During normal engine operation, the temperature in the exhaust manifold or reactor can be maintained within the desired range by controlling the engine carburetion. To protect the reactor from overheating during a sustained high power operation, an automatic leaning of the carburetor mixture by the introduction of additional atmospheric air into the intake manifold by particular mechanical means is provided. (Author abstract modified)

22190

APTIC NO. 41805

Kraus, Bernhard J. and Dae Sik Kim

LOW-POLLUTING INTERNAL COMBUSTION ENGINE WHEREIN EXHAUST GASES ARE RECYCLED IN A CONTROLLED PATTERN. (*Esso Research and En-*

gineering Co., Linden, N. J.) U. S. Pat. 3,643,640. 3p., Feb. 22, 1972. 9 refs. (Appl. Feb. 12, 1970, 7 claims).

A low polluting internal combustion engine is described whereby objectionable compounds such as nitrogen oxides, carbon monoxide, and unburned hydrocarbons are minimized in the exhaust gases. This is accomplished by recycling exhaust gases to the engine only when the throttle is intermediate between the idle position and the full throttle position and when the engine is not being choked. These objectionable constituents are also greatly minimized by the introduction of a controlled pulsed air stream into the exhaust ports at points adjacent to the exhaust valves when these exhaust valves are open. Furthermore, undesirable overheating of the exhaust manifold is prevented by introducing additional air into the intake manifold when the pressure in the exhaust manifold remains at a predetermined figure for a predetermined duration.

22191

APTIC No. 41808

Kraus, Bernhard J. and Dae Sik Kim

LOW-POLLUTING INTERNAL COMBUSTION ENGINE WHEREIN SECONDARY AIR IS INJECTED INTO THE EXHAUST PORTS. (Esso Research and Engineering Co., Linden, N. J.) U. S. Pat. 3,643,425, 4p., Feb. 22, 1972. 4 refs. (Appl. Feb. 12, 1970, 2 claims).

A low-polluting internal combustion engine is described, in which secondary air is injected in a pulsed manner into the exhaust ports of the cylinders when the port valves are open to permit the ejection of exhaust gases. The shape, duration, and timing of these pulses are controlled with respect to the engine cycle. (Author abstract modified)

22192

APTIC No. 41783

Kreiser, R.

ODOR PROBLEMS IN THE LACQUER INDUSTRY. (Geruchsprobleme der Lackindustrie). Text in German. Schriftenreihe Ver. Wasser-Boden- Lufthyg. (Berlin), no. 35:105-111, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Odor problems develop in the lacquer industry in the production of resins, the production of lacquers, their application, and particularly the drying and burning of lacquered material. Odor emissions in the first two cases are avoided by using entirely enclosed process facilities. In order to avoid odor emissions in the application of lacquers, aqueous lacquer solutions are applied by dipping. The concentration of organic substances in waste gases from such processes were 1.8 mg/cu m maximum. This low concentration of odorous substances in the waste gas makes any total removal more difficult. Thermal and catalytic afterburners are widely used in the lacquer industry. Enormous efforts have been made for developing lacquering processes which work without solvents. Such processes include plating material with foils which have the appearance of a lacquer film or the use of pulverized lacquers.

22193

APTIC No. 41195

Kriegel, E.

PERFORATED-BASE SCRUBBER FOR THE EXHAUST AIR FROM PAINT PLANTS. DEVELOPMENT AND OPERATING RESULTS. (Siebboden-waescher fuer die abluft von Lackieranlagen. Entwicklungs- und Betriebsergebnisse). Tech. Mitt. Krupp, 28(3):97-103, 1970. 2 refs. Translated from German. 21p.

Based on an industrial evaluation of existing wet scrubbers for spray painting plants and on an analysis of the requirements, a scrubber in which the exhaust air is purified in a layer of bubbles or foam on a perforated base was developed and studied. A working model, a pilot system, and finally a working system were produced and tested. Through use of similarity relations, stepwise enlargement of the test systems caused no difficulty.

The capacity of the perforated-base scrubber was finally tested under practical conditions in a full-scale working system to obtain operating data especially on fouling, during longer working periods. Air throughput, water circulation, water evaporation, formation of bubble layers, pressure loss, and degree of separation were measured. Standard values taken from the literature provide a direct comparison of the perforated-base scrubber with conventional methods. Due to the success of the prototype, the perforated-base scrubber is being introduced into general use. (Author summary modified)

22194

APTIC No. 42029

Krill, Helmut

ACTIVATED CHARCOAL APPLIED IN WASTE GAS CLEANING. (Aktivkohle in der Abluftreinigung). Text in German. Chem. Tech. (Berlin), 1(5): 239-243, 1972.

Activated carbon is suited for the adsorption of pollutants in gas and vapor form. Its field of application thus lies in the recovery of solvents, in air and gas purification, and in odor removal or abatement, but purification by adsorption of large volumes of gases containing trace quantities of pollutants presents problems. The type of activated carbon chosen must exhibit a high selectivity for the pollutant in question, chemical inertness to water, steam, acids, alkali, and the pollutant, mechanical strength, thermal stability, and high adsorptive capacity. These properties are especially important when odors with extremely low olfactory thresholds are to be removed. Different activation processes, such as gas activation using charcoal, or peat-coke, or chemical activation using non-carbonized peat, or sawdust yield activated carbons of different characteristics. For pollution control purposes granules 0.5-4 mm in diameter are used with an inner surface between 1000 and 1500 sq m/g and a pressure loss of 60-400 mm water for 0.25-1m deep beds. A desirable micropore radius should lie within the range of 4-10 Angstrom. A knowledge of the physical and chemical characteristics of the gas to be adsorbed is a precondition for the choice of a suitable type of activated carbon. Straight-chain molecules are adsorbed easier than branched-chain molecules, and a difference in the adsorption of aliphatic and aromatic compounds has been noted. The lower the concentration of the pollutant, the longer it takes to reach a state of equilibrium with adsorption velocity. Adsorption capacity decreases with temperature and humidity, and increases with inner surface, concentration of the adsorbed substance, molecular weight, and boiling point. Adsorption can be coupled with chemical conversion if the adsorbent is impregnated with an inorganic or organic salt which reacts with the substance to be removed. Impregnation with copper, zinc, silver, chromium, cobalt, manganese, vanadium, or molybdenum salts makes possible the quantitative removal of ammonia, mercaptan, phosgen, ethylene, hydrogen chloride, hydrogen sulfide, mercury, hydrogen cyanide, and arsine. 0

22195

APTIC No. 41556

Kushnir, S. V. and M. N. Chirchik

CARBON SULFIDE FORMATION DURING THE CONVERSION OF SULFUR DIOXIDE WITH METHANE IN THE PRESENCE OF AN ASBESTOS CATALYST. (Obrazovaniye serougleroda pri konversii sernistogo gaza metanom na asbestovom katalizatore). Text in Russian. Zh. Prikl. Khim., 45 (4):839-846, 1972. 9 refs.

Concentrated hydrochloric acid-washed asbestos fibers constitute an effective catalyst in the formation of carbon disulfide during sulfur dioxide conversion with methane. An SO₂/CH₄ ratio ranging from 0.5 to 0.7 at 800-900 C temperatures under 2000-3000/hr volumetric rate conditions constitutes the optimum operating parameter of the catalyst. Along with the formation of CS₂, a process of its hydrolysis through water vapor on the catalyst surface occurs. However, the rate of CS₂ formation is much higher than that of its hydrolysis below 950 C temperatures. The kinetics of CS₂ formation undergo a sudden change between 820 and 840 C temperatures

indicating the existence of at least two mechanisms of the conversion process, one, occurring at low temperatures (below 820 C), and one, occurring at high temperatures (above 840 C).

22196

APTIC NO. 41774

Lachnit, F.

DECOMPOSITION OF ODOROUS SUBSTANCES THROUGH BIOFILTERS. (*Abbau geruchsintensiver Stoffe durch Biofilter*). Text in German. *Schriftenreihe Ver. Wasser-Boden-Lufthyg.* (Berlin), no. 35:65-69, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Biofilters are generally composed of date-type filters for preliminary removal of coarse aerosols such as fat droplets, dust, and fibers; a radial blower for 100 to 200 mm water; a wetting device; a biofilter bed of special earths on grates; and a protective cover. The vapors from chicken manure drying require preliminary treatment of the waste air before it passes through the biofilter. The temperature should not exceed 35 C. The characteristic data of five existing plants are given. An animal flaying station received a biofilter in 1970 at a cost of approximately \$11,250 for treating 7800 cu m gas/hr. The filter area spans 12.5 sq m. The plant operates with a 12 kW-blower and a pressure of 200 mm water. The entering waste air has a relative humidity of 60% and a temperature of 25 C. Two other flaying stations were equipped with approximately \$7,500 biofilters for treating 5200 cu m waste air/hr. The filter area is 8 sq m. An 8 kW-blower is used, and the pressure is 200 mm water. Other biofilters are in operation in a food plant, a pig breeding farm, and a chicken manure drying station. Apart from some minor troubles, the odors are usually removed satisfactorily.

22197

APTIC NO. 41666

LaMantia, C. R., E. R. Bangel, R. Phillips, and T. J. Lamb

SULFUR, SULFURIC ACID AND POLLUTION PROBLEMS, PART I. Preprint, American Inst. of Chemical Engineers, New York, 38p., 1970. 4 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 63rd, Chicago, Ill., Nov. 29-Dec. 1, 1970.)

A technical and economic analysis and feasibility study was made on four methods of flue gas sulfur dioxide control. The methods considered were lime and limestone slurry scrubbing, with disposal of solid calcium sulfite/sulfate; sodium hydroxide scrubbing, with treatment and disposal of a solution of sodium sulfite/bisulfite; sodium hydroxide scrubbing, with regeneration of the absorbent using lime, and the disposal of solid calcium sulfite/sulfate; and ammonium solution scrubbing, with treatment and disposal of a solution of ammonium sulfite/bisulfite. The following criteria were considered: emission reduction, technical risk, reliability, appropriateness of the process, and capital investment and operating costs. The sodium hydroxide scrubbing process with aeration and disposal of a liquid waste was the simplest of the processes considered, involved the minimum technical risk, had the highest reliability, and was the most economically attractive. The sodium hydroxide scrubbing process with lime regeneration and production of a solid, rather than liquid, waste represents the best alternative when an acceptable liquid waste stream cannot be produced. The emission reduction is comparable to that of the non-regenerative sodium hydroxide process but is more complex and consequently is considered to have a lower reliability and higher degree of technical risk.

22198

APTIC NO. 41456

Laskowski, W.

A THERMAL METHOD OF ACTIVATING ALLOY-STEEL ELECTRODES USED ON ELECTROFILTERS. *Air Conserv.* (English translation from Polish *Ochrona Powietrza*), 3(1):10-17, 1969. 8 refs.

NTIS: TT 70-55123/1

Previous attempts to modify alloy-steel electrodes in electrofilters involved a two step thermochemical method. The electrodes were heated, cooled, and painted with a barium oxide suspension. This method can be replaced by a thermal method limiting the activation process to a single function. Electrodes are drawn through a 1000 C chamber containing oxides of calcium, strontium, and barium. Emission efficiency was measured before and after activation by recording the anode current. The spacing of the anode plates and the emission electrodes was 300 and 180 mm, respectively. The emission values for Ca, Sr, and Ba are 2.76, 2.35, and 2.29 eV.

22199

APTIC NO. 41120

Lauer, H. and H. Leib

REMOVAL OF INDUSTRIAL REFUSE BY MEANS OF SANITARY LANDFILL AND COMBUSTION.

Beseitigen von Industrieabfaellen durch Deponie und Verbrennung. Text in German. *Chem. Ind. (Duesseldorf)*, 24(5):279-283, May 1972. 7 refs.

The chemical enterprise BASF constructed a rotary shaft furnace for the combustion of waste oils, domestic refuse, packings, wood, chemical agents, and waste colors. It consists of an inclined brick-lined cylinder rotating around its axis. As the incineration of chemical residue causes low-temperature gases, the feeding of refuse and air is effected at the cold end while the gas and slag leave at the hot end. Temperatures in the furnace must be higher than 750 C so that the slag is sterile and can be dumped without problems. The rotary shaft furnace of BASF consists of a waste heat boiler with wall heating surfaces which can be easily cleaned during operation, thus enabling a long service time of the boiler. It serves the purpose of cooling down the flue gases having a temperature of 1000 C. The flue gases are emitted into the atmosphere through a chimney of 120 m height after dedusting in an electrical filter system.

22200

APTIC NO. 40957

Lee, Bernard Shing-shu and Frank C. Schora, Jr.

DESULFURIZATION OF COAL. (*Inst. of Gas Technology, Chicago, Ill.*) U. S. Pat. 3,640,016. 5p., Feb. 8, 1972. 4 refs. (Appl. March 28, 1969, 7 claims).

Previous attempts to desulfurize coal by oxidation consumed a substantial portion of the coal without reducing the sulfur content sufficiently. Desulfurization by hydrogen reduction alone has consistently been limited by equilibrium conversion even at high temperatures as well as by hydrogen recycle problems. An improved method is described for desulfurizing coal by reacting sulfur containing bituminous coal with hydrogen in the presence of a hydrogen sulfide getter at a temperature of about 600-800 F. Introducing the getter strongly shifts the equilibrium conversion toward greater hydrogen utilization by permitting more desulfurization to take place. Lime, calcined dolomite, or other alkaline earth metal oxides are examples of inexpensive and effective getters.

22201

APTIC NO. 42179

Lefort, Pierre

AERONAUTIC TECHNIQUES APPLIED IN POLLUTION AND NOISE CONTROL. (*Techniques aeronautiques appliquees aux luttes anti-pollution et anti-bruit*). Text in French. *Genie Civil*, 92(4):191-196, April 1972. 2 refs.

The air in Paris contains from 0.3 mg to 1 mg particulates/cu m with the majority of particles small enough to penetrate into the lungs. The particles also adsorb noxious gases which otherwise would dissipate in the atmosphere. The only way to remove this type of pollution is to filter the air. The Societe Bertin has for this purpose developed dust arrester towers 5 m high, 1.6 m in diameter, weighing 1400 kg, consuming 2 kW/hr, which treat 100 million cu m air/yr, reclaiming from 30 to 50 kg dust. Several thousand such towers spaced out on side walks could clean the air in the entire city of Paris. Defogging of airports to prevent the interruption of takeoffs and of

landings of aircraft during periods of poor visibility can be accomplished by raising atmospheric temperature by 2 C by a thermal process which results in the evaporation of fog droplets. To that end the Societe Bertin has developed the Turboclair process which utilizes the thermal and kinetic energy of exhaust gases from turboblowers. The turboblower ATAR used for this purpose emits about 50 kg air/sec at a temperature of 500 C and a flow velocity of 500 m/sec. The air jet is directed obliquely towards the ground where it mixes with ambient air and dissipates the fog. An experimental station installed at runway 4 of the Orly airport accomplishes defogging by eight jet streams of hot air from eight turboblowers within a circle 300 m in diameter to an altitude exceeding 30 m. The system after 10 years of testing is ready for operational use. Some industries require clean pollution-free rooms whose atmosphere does not contain more than a minimum of 3.5 particles of a diameter of 0.5 micron/l air, or a maximum of 3.55 particles of 0.5 micron plus 25 particles of 5 micron diameter/l air. The Societe Bertin has developed modular restricted access units which meet these standards when certain precautions are observed. Pollution from combustion can be reduced by burning an oil-water emulsion (ELF method) in furnaces, by analyzing each case and improving combustion by a change of fuel, by changing the shape of the flame and the air-fuel ratio, and by other methods.

22202

APTIC NO. 41722

Litvinov, A. T.

FINE CLEANING FROM A GAS BY REMOVING HIGHLY DISPERSED HYDROPHOBIC PARTICLES USING THE CONDENSATION EFFECT. (*Tonkaya ochistka gaza ot vysokodispersnykh gidrofobnykh chastits ispol'zovaniyem effekta kondensatsii*). Text in Russian. *Stal*, vol. 2:184-186, 1972. 5 refs.

Of the different methods used in introducing liquids into pilot plant size Venturi-type scrubbers, the scrubber operating in a condensation mode (liquid injected radially inward from the throat periphery) was 3 times more effective in removing hydrophobic particulates from a gas stream (at 73-100 m/sec at a pressure drop factor of 0.13) than scrubbers utilizing a central nozzle in the converging section for the spraying of liquid from the center to the periphery. Most efficient cleanup of particulates was obtained at a gas inlet temperature of 65 C to 68 C; a foamed scrubber operating in a 2-stage condensation mode yielded a highest cleanup of particulates at high (around 60 C) water exit temperatures.

22203

APTIC NO. 41613

Livbjerg, Hans and John Villadsen

KINETICS AND EFFECTIVENESS FACTOR FOR SO₂ OXIDATION ON AN INDUSTRIAL VANADIUM CATALYST. *Chem. Eng. Sci.*, 27(1):21-38, Jan. 1972. 35 refs.

An experimental study of the reaction rate for sulfur dioxide oxidation on a commercial vanadium oxide catalyst is presented. Results in the purely kinetic region are correlated by means of 12 published rate expressions. Most rate expressions are adequate only in a narrow temperature and composition range that probably no single rate expression can be applied in the whole range of industrial operating conditions. Experiments with large size pellets were used to determine catalyst effectiveness as a function of temperature and conversion. A serious transport resistance occurs for T greater than or equal to 450 C, and the effectiveness decreases somewhat at high conversion. The effective diffusivity of SO₂ was determined, and the tortuosity of the catalyst was calculated. The effective diffusivity can be determined on the basis of a gas-phase diffusion model, and the tortuosity factor falls within the range of previously published values with a slight increase for high conversion and possibly also for low temperature. (Author abstract)

52

22204

APTIC NO. 41574

Lunt, R. S., L. S. Bernstein, J. G. Hansel, and E. L. Hoki

APPLICATION OF A MONEL-PLATINUM DUAL-CATALYST SYSTEM TO AUTOMOTIVE EMISSION CONTROL. Preprint, Society of Automotive Engineers, Inc., New York, 16p., 1972. 5 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720209.)

A dual catalyst equipped test vehicle, containing Monel catalysts for the reduction of oxides of nitrogen followed by platinum oxidation catalysts, has controlled emissions of carbon monoxide, hydrocarbons, and oxides of nitrogen to levels of 8.0, 0.4, and 0.8 g/mi, respectively, using the single bag 1972 federal test procedure. The Monel catalyst was fabricated in a low mass, high surface area, open mesh structure. The low mass contributed to rapid warmup of both the reduction and oxidation catalysts, while the high geometric surface area permitted efficient conversion of all three pollutants simultaneously when the vehicle was operated only slightly richer than stoichiometric. The mechanism of Monel strength loss, currently the limiting factor in catalyst life, was grain-boundary widening due to alternate oxidation-reduction reactions undergone by the metal. Reinforcement of Monel by an oxidation resistant metal, particularly when accompanied by fabrication into a unitary structure, significantly improves strength and maintenance of low pressure drop. A rapid method for Monel surface activation can replace inconvenient vehicle activation. Heating in moist air for several hours develops the surface roughness necessary for high activity. Laboratory tests of a technique for enhancing the warmup rate of the oxidation catalyst by means of an electrically heated trigger element are described. (Author abstract modified)

22205

APTIC NO. 41206

Makhov, V. Z. and M. S. Khovakh

INVESTIGATION OF THE EFFECT OF FUEL ADDITIVES ON THE FORMATION AND BURNING OF CARBON BLACK IN THE DIESEL ENGINE CYLINDER. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopymi Gazami Avtomob., Proc. Symp., 2nd, 1971. 10 refs. Translated from Russian. 17p.

A procedure was developed to determine the carbon black content in the zone of the combustion chamber in a diesel engine and to evaluate the amount of carbon black being formed and burned. Experimental study and mathematical analysis of the change that takes place in the quantity of carbon black that forms with respect to crank angle in the case of diesel fuel, and of diesel fuel with the TsTM additive, revealed that the highest carbon black burn-up rate occurs during the period of intensive carbon black formation. It was established that the effect of additives TsTM and A-2 on the carbon black burn-up process in the diesel engine cylinder appears at different stages of the combustion process. The TsTM additive increases the quantity of burning black in the initial stage of the combustion process, whereas the A-2 additive acts at later stages of the process. The use of additives acting at different stages of the carbon black formation process in the diesel engine is one way to increase the effectiveness of such action.

22206

APTIC NO. 42046

Mansson, Bo Gustav Emil

APPARATUS FOR SEPARATING SOLIDS IN A WHIRLING GASEOUS STREAM. (Assignee not given.) U. S. Pat. 3,643,800. 9p., Feb. 22, 1972. 5 refs. (Appl. May 21, 1969, 6 claims).

A device for separating solids is described which comprises a cylindrical separating chamber, an axial inlet for introducing a whirling gaseous suspension into the chamber, and an annular plate which extends radially outward and downward to define

an annular gap with the chamber wall. An upper axially disposed outlet includes an upper annular plate which defines an upper annular gap with the chamber wall. A scroll structure imparts a rotary motion to a secondary gaseous stream in the same direction as the feed suspension. Pneumatically conveyed material can be introduced straight into this centrifugal separator without prior separation. The separating process is stabilized by compelling the flow of air and material entering the separator chamber to rotate by means of a variable guide apparatus. The volume of the separator chamber and the process of separation can be varied by altering the ratio of the power laden stream of primary air and the rotating secondary gas stream. Compared with conventional devices, this results in a substantial increase in operational and sorting range, as well as in a greatly enhanced efficiency of separation. (Author abstract modified)

22207

APTIC NO. 41232

Manusadzhyants, Zh. G.

INVESTIGATION OF THE EFFECT OF THE TECHNICAL CONDITION AND OF SOME OF THE ADJUSTING PARAMETERS FOR CARBURETORS ON THE CONTENT OF CARBON MONOXIDE IN VEHICULAR EXHAUST GASES UNDER OPERATING CONDITIONS. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopnymi Gazami Avtomob., Proc. Symp., 2nd, 1971. Translated from Russian. 11p.

A total of 5000 vehicles were checked to obtain a sample of the actual CO content in the exhaust gases. Analysis revealed that the statistical distribution obtained agreed well with the normal distribution law hypothesis. The CO content in the majority of vehicles checked was between 2.5 and 3.5%. It is known that the mixture prepared by the carburetor is the most influential of the factors governing the CO content in the exhaust gases. A plot of the idling characteristics showed that CO in the exhaust gases can change from 0.5 to 8.0% over the range of idling speeds for engines with carburetors in different technical conditions. Further study revealed that carburetor idling speed adjustment influenced change in the CO in the exhaust gases when the engine was running at low idling speed, but had virtually no effect at high idling speeds.

22208

APTIC NO. 41465

Manz, Oscar E.

LIGNITE FLY ASH UTILIZATION. Bureau of Mines Information Circ., no. 8471:138-149, 1970. 17 refs. (Presented at the Bureau of Mines-University of North Dakota Symposium, Grand Forks, N. Dak., May 1-2, 1969.)

The growing problem of fly ash disposal has prompted research concerned with developing fly ash-based brick and stabilizing soil and other aggregates by the addition of lignite fly ash. Tests were performed on mixtures of Michigan bituminous coal fly ash and North Dakota lignite fly ash concerning the effects of the compounds on structural lightweight concrete. The addition of flyash had a negligible effect on the durability of concrete for low cement factors. At all cement factors investigated, concrete incorporating up to 30% fly ash had a strength equal to or greater than that of the control mix. Lignite fly ash produced concrete of slightly higher flexural strength and slightly lower durability as compared to bituminous coal fly ash. In experiments on utilization of fly ash in the manufacture of bricks, a very acceptable brick, meeting grade SW specifications, was made from a given type of fly ash (with 4% barium chloride) fired to 2106 F. Bricks made from other samples of fly ash, however, were less acceptable. Since chemical analyses did not indicate pronounced variations, further studies of the physical properties of these fly ashes, involving hydrometer analyses, blaine fineness, and specific gravity determinations are in progress. Despite the fact that lignite fly ash meets neither ASTM nor federal

specifications for fly ash, it has several possible uses where compliance with existing specifications is of little consequence. The high lime content (25-30%) of lignite fly ash causes a built-in pozzolanic reaction; the resulting strength values far surpass those obtainable with bituminous fly ash alone. Based on economic studies, fly ash brick can be manufactured at a cost considerably less than that for lay brick and marketed at a price to compare with that of the highest quality competitor.

22209

APTIC NO. 41810

Marsee, Frederick J.

REDUCING ENGINE EMISSIONS. (Ethyl Corp., New York) U. S. Pat. 3,646,921. 11p., March 7, 1972. 11 refs. (Appl. July 17, 1969, 11 claims).

Spark ignition engines which have their ignition temporarily retarded for a few seconds during mild accelerations do much better in smog emission tests, yet do not sacrifice performance characteristics to any significant degree. Only a few to 30 seconds of retarding is needed, but the retarding should be sharp. Retarding can be accomplished by offsetting or eliminating the vacuum advance inasmuch as such advance is normally at least about 15 deg at cruise. The acceleration responsive means for effecting the ignition retard can be connected for mechanical operation directly by the throttle control of the engine, or it can be arranged for operation by the inertia effects of a rotating portion of the engine.

22210

APTIC NO. 41638

McGrath, William L.

THE CONTROLLED ENVIRONMENT: 1984. ASHRAE (Am. Soc. Heating, Refrig. Air Cond. Engrs.) J., 14(6):56-59, June 1972. (Presented at the Royal Society of London Symposium on Building Technology in the 1980 s, London, England, Nov. 5, 1971.)

It is predicted that the next 13 yr will show advances in technology, as the last 13 yr have, leading to a world of full indoor environmental conditioning. Central residential air conditioning has multiplied 8.5 times since 1958 to 1.2 million units installed/yr. Nearly one-third of all new single-family dwellings are air conditioned, as are over 85% of all new multi-family buildings. In housing of all types, the demand for environmental control should geometrically increase. The frugal use of land, better insulation, use of reflecting surfaces, and refrigeration and heating improvements should lower the cost of heating and cooling. As urban areas become more concentrated, the necessity and possibility for waste heat use, such as that produced during electrical power generation, will result in economies and cleaner living space. Careful planning, multiple use of energy, and recycling of resources will cut waste given off into the environment. Central heating and cooling systems in urban areas will be accomplished with zero energy consumption. Educational and economic necessities will make the 10 or 12 month school year a reality. It is noted that the building industry is facing a unique opportunity to contribute to the elimination of many of the ills of our society.

22211

APTIC NO. 42024

McManus, George J.

HEAT OF POLLUTION DRIVE HITS THE COKE OVEN. Iron Age, 209(26):77-80, June 29, 1972.

Despite emissions control deadlines and commitments, steel men say it will be physically impossible to achieve an overnight cleanup of coke ovens. The two domestic builders of complete ovens could not handle all the projects resulting from a crash program. Until recently, new construction had been held up by the uncertainty of the regulations concerning acceptable emissions levels. A number of recently installed systems for charging, pushing, and quenching in the coke oven process are described. Systems have been installed which can eliminate 93% of the hydrogen sulfide emission and yield ele-

mental sulfur or sulfuric acid. Substitutes for coke, including briquettes from powdered coal and gas injection are under consideration in Japan.

22212

APTIC NO. 41049

Meisel, George M.

SULFUR RECOVERY. *J. Metals*, 24(5):31-39, May 1972. 30 refs. (Presented at the Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Annual Meeting, 101st, San Francisco, Calif., Feb. 1972.)

The feasibility of any sulfur dioxide recovery process from the flue gases of sulfide roasting, sintering, and smelting depends very much on the end product, its marketability or disposal, and the cost of reagents and fuel in the particular area. Sulfur by-products, including sulfuric acid, ammonium sulfate, liquid SO₂, elemental sulfur, calcium sulfate, hydrogen sulfide, sodium sulfite, and other alkaline sulfite-bisulfite-sulfate compounds; coincidental metallic by-products, e.g., arsenic, cadmium, zinc, mercury, and rhenium compounds; and waste gypsum are examined with respect to projected markets, economics of recovery, and price of sale. Several SO₂ removal processes are evaluated, with emphasis on process description, stage of development, reagents used, and end products. Application to metallurgical flue gas is examined for the Monsanto-catalytic oxidation process, catalytic gaseous reduction, regenerative alkaline absorption, nonregenerative alkaline scrubbing, regenerative organic absorption, regenerative solid absorption (including Reinluft process, activated carbon adsorption, and alkalinized alumina), and hot injection of absorbent (such as manganese dioxide process). Of these, catalytic conversion to H₂SO₄, regenerative organic absorption for liquefaction or reduction, regenerative alkaline absorption for catalytic conversion, liquefaction, or reduction, and non-regenerative alkaline scrubbing to waste gypsum are the most promising in the near future.

22213

APTIC NO. 42157

Masek, Miles Gregory and Sophia D. Masek

AIR POLLUTION DEVICE. (Assignee not given.) U. S. Pat. 3,653,344. 3p., April 4, 1972. 3 refs. (Appl. July 22, 1970, 3 claims).

A natural gas burning device is presented for preventing air pollution. It comprises a gas jet above the furnace containing the garbage and coal, with the burner serving to completely burn the smoke particles and gases. Smoke particles, carbon, and sulfur gases, that have been accumulated by the burning of coal and garbage can be completely burned by the device. The device is simple in design, inexpensive to manufacture, rugged in construction, easy to use, and efficient in operation. (Author abstract modified) 0

22214

APTIC NO. 41435

Mikami, Masaki, Kunio Araki, Shigeji Honda, and Nori Kamata

INVESTIGATION AND CALIBRATION OF ODOR ELIMINATION SYSTEM AT FISHMEAL MANUFACTURING PLANT. (Gyohaku seizo kojo ni okeru akushu jokyō sochi no chosa, sokutei) Text in Japanese. Hokkaidōritsu kogyō Shikenjo Hokoku (Rep. Hokkaido Pref. Ind. Exp. Stn.), no. 185:15-21, March 1972. 1 ref.

Investigations were conducted on deodorizing equipment using electrodes, the combustion method, and the absorption method at three fishmeal manufacturing factories. The electrode deodorizing equipment had a gas treating capacity of 500 cu m/min, and the water supply to the washing tower was at 30 l/hr. The rate of ammonia removal was 97.2%; amine removal, 14.0%; organic acids, 50.1%; and mercaptans, 92.1%. The combustion furnace of the second factory had a diameter of 1 m; the total length of the furnace was 3.6 m. The consumption of heavy oil was at 21 l/hr, and the flue gas was supplied at about

34 N cu m/min. The rate of organic acid removal was 87.2% and mercaptan removal, 45.0%. However, the ammonia concentration increased after the treatment. The washing tower of the test plant in the absorption method from the third factory was packed with Raschig rings; water supply was 1 cu m/hr. Ninety kg of sulfonated charcoal and 225 kg LMN (iron oxides as the major component) were used in the absorbing tower. The gas treating capacity was five cu m/min. The rate of ammonia removal was 100%; amine removal, 100%; organic acid removal, 57.1%; and mercaptan removal, 100%.

22215

APTIC NO. 41000

Minx, E. and H. Kremer

PROCESS OF STABILIZATION OF TURBULENT DIFFUSION FLAMES BY BAFFLES. (Ueber die Stabilisierung von turbulenten Diffusionsflammen durch Staukörper). Text in German. Chem.-Ing.-Tech., 44(1-2):34-40, 1972. 17 refs. (Presented at the Tagung Verbrennung und Feuerungen der VDI-Fachgruppe Energietechnik and the Deutschen Vereinigung fuer Verbrennungsforschung, Stuttgart, West Germany, Oct. 7-8, 1971.)

Baffle stabilization of turbulent diffusion flames with a burner having central fuel gas feed and annular air feed are reported. A picture of the flow and mixing processes behind the baffle are derived from available research data and then selected results of measurements to determine flame extinction limits are presented. On the basis of concentration and temperature measurements, a stability model was derived according to which the stability of the flame depends upon the position of a stoichiometric flame front within the field of flow behind the baffle. The attainable fuel conversion in the flame front of diffusion flames was of decisive importance for flame stability.

22216

APTIC NO. 42061

Miura, Mitsugu and Akio Kinoshita

DEODORIZATION BY SCRUBBING. (Senjoho ni yoru dasshu). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(5):51-53, May 1972.

A carbohydrate (starch) manufacturing plant which produced a strong odor of decomposing protein and gluten installed a scrubber, Bluebird, and successfully eliminated the odor problem. Another factory with an odor problem of amine, butyric acid, and a mixture of some other elements installed another type of scrubber, Sudare, and solved the problem. The principles of the two scrubbers are explained briefly with illustrations. The Bluebird is a vertical cylindrical scrubber with a liquid tank at the lower end. The odor-containing gas is supplied from the lower part at a high speed of 15 to 30 m/sec and enters the inner cage with numerous micro slits. As it passes through the water, the water rises with the gas current and forms a thin film of liquid. The high speed gas enters from slits, atomizing the film of water, moves upward in the cage in a whirlwind and goes out from other slits into the space of the outer cylinder, where water and gas separate. Sudare consists of a liquid tank at the bottom, a water supplier at the top, a gas entrance opening also at the top, and an atomizing device made of bamboo-screen-like filaments. The gas enters from the upper entrance at a high speed and passes through the atomizing device which is made of a bundle of micro-wire filament screen. The gaps between wires (sticks) are one or two mm long. The speed of the gas is 40 to 50 m/sec. The thin liquid films formed on the surfaces of filaments are blown by the high speed gas. The liquid which absorbed odor elements drops into the tank. Micro liquid drops are separated by a liquid eliminator.

22217

APTIC NO. 42185

Miura, Mitsugu

MIURA CHEMICAL APPARATUS CO. LTD. DUST COLLECTOR. (Miura kagaku sochi (kabu) sei shujin sochi ni tsuite). Text in Japanese. Osaka no Sora (Sky Osaka), no. 14:33-36, March 1972.

CONTROL METHODS

22223

Several improved scrubbers for more effective dust collection are described. A new scrubber with multiple slots provides the same efficiency with less pressure loss at 15-25 m/sec flow rate than a scrubber with only one slot at 70-100 m/sec flow rate. Another scrubber was equipped with round poles at 1 m/m distance, and gas containing particulates and sulfur dioxide was supplied with water or sodium hydroxide solution at speeds of 15-20 m/sec for multiple venturi action. Scrubbers equipped with parallel panels at 15-20 m/m distance are used for high speed gas-liquid contact. Pashaian scrubbers apply the sprinkler theory.

22218

APTIC NO. 41110

Miyake, Masataka

DEVELOPING A NEW STRATIFIED-CHARGE COMBUSTION SYSTEM WITH FUEL INJECTION FOR REDUCING EXHAUST EMISSIONS IN SMALL FARM AND INDUSTRIAL ENGINES. *Preprint, Society of Automotive Engineers, Inc., New York, 16p., 1972. 5 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720196.)*

To conform the small farm and industrial engine to the requirement of low pollution, the Mitsubishi Combustion Process, a new stratified charge combustion system, was tested on small farm and industrial engines. The new system is accomplished by controlling the air swirl and improving the injection nozzle in regulating fuel injection, which reduces poisons from exhaust emissions. The spray form should be an ignition spray with short penetration at light load, and it should be a load spray with more penetration at heavy load. The engine can be operated stably at a lean mixture of air-fuel ratio of 78:1. The proper air velocity of the swirl at the spark plug is about 15 m/sec. Fuel should be injected against the air swirl so that the ignition would not be critical and stable combustion would be ensured. With gasoline, a measurement of exhaust emissions showed that the concentrations of hydrocarbons, carbon monoxide, and nitric oxide are 80 ppm, 0.20%, and 600 ppm, respectively, at the rated horsepower. The engine can be operated on gasoline, kerosene, light oil, and diesel oil. (Author summary modified)

22219

APTIC NO. 41011

Miyauchi, Yasuji

AUTOMOTIVE EXHAUST GAS PURIFIER. (*Sharyoyo haiki gasu seijoki*). Text in Japanese. (Assignee not given.) *Japan. Pat. Sho 46-36322. 2p., Dec. 14, 1971. (Appl. Feb. 13, 1969, 1 claim).*

On the rotating axis of the purifier casing, an air guiding vanes, an adsorption brush, and a water separation brush are attached in parallel, in three consecutive chambers. Automobile exhaust gas is led to the first chamber and the guiding vanes rotate the gas and force it to the adsorption chamber. There is a clean water tank at the bottom of this chamber, and a part of the brush is in the water. The brush rotates, and the gas is cleaned as the brush adsorbs soot, carbon monoxide, and sulfur oxides in the water. The cleaned gas goes to the next chamber, where another brush separates water and the gas by rotation. Clean gas is emitted from the exit from this chamber.

22220

APTIC NO. 42056

Moore, Lester P.

GAS LIQUID SEPARATOR. (Assignee not given.) *U. S. Pat. 3,641,745. 5p., Feb. 15, 1972. 10 refs. (Appl. Jan. 31, 1969, 4 claims).*

A gas liquid separator is presented in which a conical deflector is interposed between relatively aligned and spaced conduit sections through which a flowing gas stream with entrained liquid moves. The conical deflector has its apex directed up stream to deflect the flowing stream of gas and liquid radially outward. Thus, the gas may return radially inward after separation by inertia of the large masses of liquids to reenter

the downstream conduit section for delivery to and through a spiral passageway surrounded by a multiperforated cylindrical shell. Here, the velocity of the gas and its resulting swirling action centrifugally impel the remaining entrained smaller particles against the inner face of the cylindrical shell, the liquid then being free to escape through the perforations in the shell, while the flowing stream of gases is substantially confined within. (Author abstract modified)

22221

APTIC NO. 41474

Morgan, Oliver P.

CONTROL OF EMISSIONS FROM THE WEYERHAEUSER COMPANY KRAFT MILL AT SPRINGFIELD, OREGON. *Preprint, American Chemical Society, Washington, D. C., 15p., 1971. 4 refs. (Presented at the American Chemical Society, Northwest Regional Meeting, Annual, 26th, Bozeman, Mont., June 16-18, 1971)*

By control of three factors, a 98% or better control of the kraft mill odor problem can be obtained. The factors are: odor release from the Cascade evaporator, release of non-condensable gases, and odor release from the recovery furnace. The accomplishments at the Springfield mill in controlling these factors are discussed. A furnace which does away with the direct contact evaporator, the greatest potential source of hydrogen sulfide in the recovery system, was put into production recently. Air is heated by the hot flue gases through an air heat exchanger. The hot air performs the final black liquor evaporation in a contact evaporator and is then admitted to the furnace as combustion air. Collection of non condensable blow gases was a great challenge since they came with a rush over a period of 5-10 minutes while the digester was blowing, then stopped until the next one blew. The gases had to be contained, with no air dilution, because they are also explosive. A design similar to those used in the petroleum industry to prevent escape of volatile vapors from storage tanks was chosen. For collecting blow gas, a 27 ft diameter steel sphere was designed, to hold up to 10,000 cu ft of gas. Inside the sphere, a gas-tight flexible diaphragm was designed to rise with the rush of gas coming into the sphere at the bottom, and then fall slowly as the gas was drawn out at a constant and controlled rate to the fume destroying furnace. Operating controls which contribute to reduction of odor in the kraft pulping process include addition of about 2.5% excess oxygen, careful control of the percentage of secondary air and the droplet size of the black liquor entering the furnace, and operation in the lower range of sulfidity which will give adequate pulp quality.

22222

APTIC NO. 42090

Morita, Tomijiro

THE WASTE GAS DESULFURIZATION BY SODIUM SULFITE-GYPSUM SYSTEM. (*Aryuso-sekkoho haien datsuryu*). Text in Japanese. *Kagaku Kogyo (Tokyo), 23(7):915-921, July 1972. 7 refs.*

Kureha Chemical Industry finished a pilot study of the waste gas desulfurization by sodium sulfite-gypsum system. Kureha sodium sulfite-gypsum system is the wet method using a sulfurous acid soda solution. Absorption, double decomposition, and oxidation are the main processes. The sulfur dioxide from the boiler is almost perfectly absorbed by the sulfurous acid soda solution. Sulfurous acid soda solution becomes mirabilite by oxygen in the waste gas. Since mirabilite inhibits the process absorption, it must be controlled. Sulfite calcium which is produced as the result of double decomposition, is oxidized and becomes gypsum. From the economical view point, this is the best method for desulfurization.

22223

APTIC NO. 41572

Motina, G. L.

UTILIZATION OF POLYURETHANE FOAMS IN AIR CLEANING PROCEDURES. (*O primenii penopolietana dlya ochistki vozdukh*). Text in Russian. *Khim. Farm. Zh. (Moscow), 6(4):44-45, 1972. 3 refs.*

Polyisocyanate polyurethane foams are first subjected to multiple treatment with concentrated alkali solutions to make them suitable for air filtration purposes. This treatment provides a distinct cellular structure of the foam by removing the cell masking membrane particles of the non-treated material. Tests performed on alkali-treated materials revealed a 0.45 filtration coefficient for 1.8 cm thick samples under 5 cm/sec air flow rate and 0.4 mm water column resistance to the air flow conditions. Utilization of polyurethane requires the equipment of any filter type to be provided with a differential water pressure gauge. The operating diameter of the filter fabric is determined by its increase in initial air flow resistance from 8.0-10.0 to 60.0-70.0 mm water column and depends on the dust content of the air. Regeneration of the fabric prospectives in the utilization of polyurethane foams as filter fabrics are anticipated.

22224

APTIC NO. 41627

Muehlen, Nikolaus Von zur

AIR POLLUTION IN THE AUTOMOBILE INDUSTRY.

Staub, Reinhaltung Luft, 131(10):411-414, Oct. 1971.

The major emissions from automobile manufacturing are the solvents from lacquer drying. Thermal and catalytic combustion was used for the destruction of the solvent vapors in a car factory; the heat was recovered and used for the drying ovens. Catalyst poisoning was not observed during two years of operation of the catalytic plant, and maintenance was directly in the washing of catalytic elements with distilled water. The economics of direct flame and catalytic combustion is compared. Other pollution measures, such as a large garbage incineration plant with 200/day capacity, a sludge separation plant, and a chemical treatment plant for chromium, nickel, copper, iron, and cyanide are mentioned.

22225

APTIC NO. 41284

Muehlen, Herbert

REMOVAL OF WELDING VAPOR BY SUCTION. (Ab-saugung von Schweißrauch). Text in German. Wasser Luft Betrieb, 136:217-220, June 1969.

Intense development of gases and vapor occurs during electric welding. As a rule, the gases contain dust particles in sizes from 1 to 10 micron, depending on the type of electrode used. In gas welding, significant generation of vapor takes place only if the parts to be welded carry paint or oil residues. Equipment for disposing of welding vapors and constituent dust by suction, based on removal directly at the source, is described. One mobile suction device consists of a suction hood connected to a fan by a flexible hose. A second hose, attached to the discharge side of the fan, conducts the vapor out of the shop and into the open air. In another design arrangement, swivel pipes of about 2 m radius carry the suction hood at one end and pass through the wall to connect to a suction fan located outside the wall. By means of a manifold piping arrangement one fan can serve several suction arrangements. A widely employed device is a welding table, which consists of a box of 750 mm high used as support table for the welding work. The top of the table is formed by a removable grate or perforated steel plate. A fan mounted inside the box sucks the vapor downward into the box and blows it out into the open air. Falling welding material particles and scale accumulate inside the box for periodic removal. Tables for flame cutting are also described. For economical operation during winter, inside air can be recirculated by passing vapors through a suction fan-equipped electrostatic precipitator for dust removal; the cleaned air is released to the shop atmosphere.

22226

APTIC NO. 42134

Muroki, Takumi

SYSTEM FOR PURIFYING AN EXHAUST GAS FROM AN INTERNAL COMBUSTION ENGINE. (Toyo Kogyo Co. Ltd., Hiroshima (Japan)) U. S. Pat. 3,648,455, Sp., March 14, 1972, 6 refs. (Appl. March 13, 1970, 5 claims).

An improved system for purifying the exhaust gas of an internal combustion engine is described. The system produces a silencing effect by introducing excess secondary air against a buffer plate provided in the air cleaner of the engine to cool the air heated by the compression of the air pump. In previous devices the exhaust gases would be exhausted without being injected with secondary air, while the secondary air would be exhausted through a relief valve into the atmosphere. When such a large quantity of secondary air is exhausted into the atmosphere, a considerable noise is generated.

22227

APTIC NO. 42134

Muroki, Takumi and Motoyuki Hayashida

DEVICE FOR PURIFYING THE EXHAUST GAS OF AN INTERNAL COMBUSTION ENGINE TO REDUCE THE NITROGEN OXIDE CONTENT. (Toyo Kogyo Co. Ltd., Hiroshima (Japan)) U. S. Pat. 3,648,672, Sp., March 14, 1972, 8 refs. (Appl. Oct. 8, 1970, 4 claims).

A device is presented for reducing the nitrogen oxide content of internal combustion engine exhaust gas. It comprises an exhaust conduit for introducing part of the exhaust gas into an intake passage of the engine, a valve opened by a diaphragm device to allow passage of the exhaust gas when the vacuum acting on the diaphragm passes a predetermined value, and a vacuum conduit. The vacuum conduit is connected to the intake passage at a position adapted to open upstream of a throttle valve when the throttle valve is closed and to open downstream of the throttle valve when it is slightly opened. Control devices operate to sense the engine temperature and introduce the intake vacuum into the diaphragm when the sensed temperature is over a predetermined value.

22228

APTIC NO. 41909

Muter, Richard B. and William F. Lawrence

UTILIZATION OF COAL-BURNING POWER PLANT BY-PRODUCTS. Dept. of Interior, Washington, D. C. U. S. Pat. 3,641,445, 4p., Feb. 15, 1972, 3 refs. (Appl. April 30, 1970, 8 claims).

One of the methods of controlling the release of power plant sulfur oxide gases to the atmosphere has consisted of using alkaline earth carbonates, such as limestone and dolomite, either mixed with the coal before combustion or injected above the combustion zone of the furnace. This results in thermal conversion of the carbonates, by the process of calcination, into the more reactive oxide forms. Sulfur gases from the fuel combine with these calcined carbonates to form alkaline earth sulfates and/or sulfites which are collected in ash collecting devices, such as precipitators, wet scrubbers, or filtering devices. Recovery of the alkaline earth carbonates is accomplished by carbonating the modified fly ash in an aqueous medium, followed by flotation to separate the resulting alkaline earth carbonates from other components of the modified fly ash. The separated carbonates are dewatered, dried, and then may be re injected above the combustion zone of the furnace or mixed with coal to be burned. The flotation reject is dewatered, dried, and may then be fired in reverberatory furnaces to form a molten ash suitable for processing into mineral wool. Sulfur gases from the flotation reject may also be processed into useful sulfur compounds, such as sulfuric acid by the contact process. (Author abstract modified)

22229

APTIC NO. 41086

Naber, Jaap Erik and Johannes Everdinus Ploeg

PROCEDURE FOR SEPARATING SULFUR TRIOXIDE FROM INDUSTRIAL WASTE GASES. (Verfahren zur Abtrennung von Schwefeltrioxyd aus Industrieabgasen). Text in German. (Shell International Research Maatschappij N.V., The Hague (Netherlands)) W. Ger. Pat. Appl. 2,119,716, 35p., April 22, 1971, (27 claims).

The industrial waste gas is contacted with an acceptor of calcined, active aluminum oxide or magnesium oxide at a tem-

perature of 330 to 450 C and a rate of 5 to 3000 l gas/l acceptor/hr. After saturation, the acceptor is regenerated with a gas containing at least 25 volume % hydrogen sulfide at a temperature within 50 C of the working temperature. The acceptor can contain oxide carriers, clay binders, glass, or pore-forming plastics, and it is heat-treated at 780 C before installation. Other sulfur compounds in the waste gas are oxidized to sulfur trioxide before contact. After treatment, the gas can be post-treated by contact with a Cu-CuO-Al₂O₃ catalyst. Gamma-Al₂O₃ was used to treat 8800 l/hr of gases containing 150 to 2200 ppm SO₃ at 425 C until 2% by weight of the acceptor was absorbed sulfur, in the form of sulfur dioxide. The existing gas contained 16 to 25% of the original amount of SO₃ or SO₂, as compared to 40% for a conventional Cu/Al₂O₃ catalyst at the same saturation. Quantitative regeneration of the catalyst was done with 100% H₂S at 425 C.

22230

APTIC NO. 40989

Neriha, Norio and Tomohiko Miyamoto

WET TYPE GAS FILTER WITH STATIC ELECTRICITY CONDENSER (Seiden gyoshubu o sonaeta shishiki kitai rokaki). Text in Japanese. (Hitachi Ltd., Tokyo (Japan)) Japan. Pat. Sho 46-42835. 2p. Dec. 17, 1971. (Appl. May 8, 1968, 1 claim).

This wet capillary filter is designed to capture particles smaller than several micron by static electricity condensing action. The tower has an entrance for polluted air at the top. It has spray nozzles at the top, corona discharge electrodes (insulated from the tower itself), earth, and a static electricity condenser comprising a high voltage plate and ground plate. Below these devices are a set of cleansing and filtering devices which are all installed with an inclination. An L-shaped partition, a plane partition, spray nozzles, a capillary filter, another set of L-shaped and flat partitions. As the gas enters the tower, particles are charged with electricity, and part of them are statically condensed. The water sprayed from the nozzles keeps the electrodes clean. Water particles are also charged with electricity and adsorb dust particles. Condensation and particle growth occur between charged particles and water particles. The enlarged dust particles are filtered through the capillary filter. The water containing dust and toxic elements drops down onto the final set of L-shaped and flat boards and flows down into receptacles.

22231

APTIC NO. 41791

Nicklin, Thomas and Frederick Farrington

TREATMENT OF GASES. (Gas Council, London (England)) U. S. Pat. 3,649,169. 3p. March 14, 1972. 2 refs. (Appl. June 4, 1969, 4 claims).

The removal of organic sulfur compounds from inorganic gases can be effected by contacting a mixture of steam and the gases to be treated with a catalyst comprising uranium oxide on an alumina carrier. The process can be used to remove carbonyl sulfide from mixtures of carbon dioxide and carbon monoxide. It can also be used to purify exhaust gases from various processes such as rubber vulcanizing, artificial fibers production, and tar distillation. (Author abstract modified)

22232

APTIC NO. 41813

Nishi, Saburo

COUNTERMEASURES FOR SO₂ BY HIGH STACKS, LOW SULFUR FUELS, AND DESULFURIZATION. (SO₂ tasaku wa koutotsu, gennentyo no tai-esuka, haidatsude) Text in Japanese. Puranto Enjinia (Plant Eng.), 4(1):42-49. Jan. 1972.

The Sumitomo Metal Industries Co. controls sulfur dioxide by various methods. Iron manufacturing causes air pollution with SO₂, dust, soot, and smoke emissions. In Japan, there are strict regulations for the discharge of SO₂, compared with other countries. The electric power plants and open hearths in

the industry produce SO₂. Methods to control SO₂ include the wind tunnel test, high stacks, low sulfur fuels, desulfurization of fuels, and desulfurizing stack gases by absorption, adsorption, catalytic oxidation, and other methods. The wet method can be used in electrical power plants and ammonia scrubbing can be used in oil refineries.

22233

APTIC NO. 42081

Oda, Ken ichi

THE TRENDS OF DESULFURIZATION TECHNIQUE

(Datsuryu gijutsu no doko). Text in Japanese. Denki Gakkaikai Zasshi (J. Inst. Elect. Engrs. Japan), 92(4):20-27, April 1972. 12 refs.

A general discussion of techniques for desulfurizing heavy oil, flue gas, and combustible gases converted from heavy oil is presented. The indirect desulfurization of heavy oil has been established as a dependable technique. The distillate with 0.2 to 0.5% sulfur content can be obtained at a desulfurization rate of more than 90%. By combining with the residue oil, a total 40% desulfurization can be accomplished. The residue of heavy oil distilled at constant pressure contains large amounts of asphalt and metal that usually poison the catalyst for desulfurization. Therefore, the development of a highly durable catalyst is the key point of this process. Further development is needed for obtaining low-sulfur heavy oil (less than 0.5%). Major dry and wet flue gas desulfurization processes are tabulated including the reactants used and the by-products formed. Dry-type absorbents usually have a slow sulfur dioxide adsorption rate. Wet-type apparatus is highly effective for dust collection but mists are always carried out by the purified gas. Therefore, a demister is needed. The desulfurization of gas converted from high sulfur-content heavy oil depends on conversion efficiency, heat efficiency, rate of desulfurization, and cost. Many methods are discussed.

22234

APTIC NO. 41211

Overskiy, A. S., A. A. Zyatkovskiy, and V. F. Kamenev

THE USE OF A VACUUM REGULATOR - IDLING SPEED ECONOMIZER SYSTEM TO IMPROVE THE ENGINEERING AND COST FACTORS FOR AUTOMOBILE CARBURETOR ENGINES. Council for Mutual Economic Aid (CEMA) and Ymposhiv Socialist Federated Republic, Sot'heniye Zagryaz. Avtozdukha Gorodak) Vykhopnyye Gaimi Avtomobil. Proc. Symp., 2nd, 1971. 6 refs. Translated from Russian. 12p.

A vacuum regulator-idling speed economizer system for use on vehicles with carburetor engine is described, and provides an effective method for reducing toxic emissions in city traffic conditions. Hygienic, engineering, and cost benefits are discussed, as well as the program of testing conducted to evaluate the system. Reductions in carbonogenic and carbon monoxide emissions are reported. The system developed can be built in different types and sizes for use on all models of automobile carburetor engines built in the USSR.

22235

APTIC NO. 42007

Palka, J. and M. Gregor

OXIDATION OF CARBON MONOXIDE BY OXYGEN ON PALLADIUM AND RUTHENIUM CATALYSTS. Chem. Zvesti, vol. 26:140-148, 1972. 12 refs.

The kinetics of carbon monoxide oxidation on palladium and ruthenium catalyst in a flow-through reactor were investigated. The formal reaction order, rate constant, and activation parameters were calculated for various compositions of the gas mixture. In the case of the palladium catalyst and excess carbon monoxide, the rate does not depend on oxygen concentration; in the case of ruthenium catalyst and excess oxygen, the rate does not depend on carbon monoxide concentration. Reaction mechanisms are discussed. The reaction rate on ruthenium catalyst is generally lower than that on palladium catalyst. For this reason the formation of carbon dioxide is

much lower on ruthenium catalyst than on palladium or mixed catalyst. For a pure gas (without sulfur compounds or unsaturated hydrocarbons), it is advantageous to remove nitric oxide from gas by one-component ruthenium catalyst to suppress carbon dioxide formation. Provided the gas is contaminated with sulfur or unsaturated hydrocarbons and the palladium catalyst has to be used, it is recommended to apply minimum temperature to avoid the undesirable oxidation of carbon monoxide.

22236

APTIC NO. 41922

Palma, Ted V. De and Robert S. Carleton

CATALYTIC CONVERTER FOR EXHAUST GASES. (Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,644,098. 7p., Feb. 22, 1972. 4 refs. (Appl. Sept. 18, 1969, 8 claims).

An efficient catalytic converter is described that is located in close proximity to the exhaust ports of the engine, thereby eliminating the need for insulated pipes and/or heating of secondary combustion air. This prevents deactivation of the catalyst particles by tetraethyl lead and other metals. The catalytic converter is constructed in such a manner that its various components are capable of expanding and contracting relative to each other as the temperature of the apparatus fluctuates. The converter encases a removable catalyst retaining cartridge which permits easy placement and removal of the subdivided catalyst particles.

22237

APTIC NO. 42052

Palma, Ted V. De and Martin W. Perga

CATALYTIC CONVERTER-MUFFLER. (Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,649,213. 5p., March 14, 1972. 4 refs. (Appl. Jan. 19, 1970, 3 claims).

A simplified and improved form of catalytic converter-muffler is described for automotive emissions control. The unit is designed and constructed in a manner to have a V-form of catalyst bed in an oval chamber, as well as to make use of special catalyst retaining screen members which will divide the interior of the chamber in a manner to give optimum gas flow and substantially eliminate expansion and contraction problems due to high temperature operating conditions.

22238

APTIC NO. 40980

Panduranga. Venkatasubbaiah

CORRECT TURBULENCE-A WAY TO REDUCE THE CONCENTRATION OF UNBURNT HYDROCARBONS FROM AUTOMOTIVE ENGINES. *Combustion Flame*, 18(3):461-467, June 1972. 16 refs.

Experiments in a spherical vessel show the role of turbulence in the reduction of emissions of hydrocarbons. With methane as fuel, turbulence of various intensities, both organized and unorganized, was tried, and resultant gases were sampled. The use of organized turbulence reduced hydrocarbons to 1/5 the concentration without turbulence. The location of the spark-plug also is critical. Small scale turbulence at the sparkplug is as important as large scale organized turbulence at the walls of the combustion chamber.

22239

APTIC NO. 42055

Patterson, Lester E., William L. Alley, and Michael R. Foster

CATALYTIC CONVERTER. (General Motors, Corp., Detroit, Mich.) U. S. Pat. 3,615,255, 4p., Oct. 26, 1971. 1 ref. (Appl. May 19, 1970, 3 claims).

A catalytic converter for automotive emission control is presented which comprises an outer cylindrical housing and an inner cylindrical element. Exhaust gases entering the converter are dispersed annularly between the members so as to flow uniformly downward through the flat, cylindrical element containing tightly packed catalyst spheres. The uniform downward flow through a relatively shallow catalyst bed acts to keep the

spheres tightly packed and results in a minimum of back pressure in the exhaust stream with maximum catalyst life and optimum conversion.

22240

APTIC NO. 42290

Pattison, John N.

MOTOR VEHICLE POLLUTION CONTROL NEWS. PROS AND CONS FOR LEAD IN GASOLINE. *J. Air Pollution Control Assoc.*, 21(6):354-355, June 1971. 5 refs.

An attempt is made to explain why lead is added to gasoline, the consequences of it on the environment, and the potential consequences of its removal. The higher the compression ratio of the engine, the hotter the mixture will get due to the heat of compression, and the more likely any given compound will be to preignite. This can be prevented by using a gasoline that has compounds that do not ignite readily such as aromatics by adding volatile lead compounds which stop these undesired flames, or by using a low compression ratio engine. Since all lead compounds have some toxicity, there is a potential hazard if too much is in the air. Other disadvantages in the use of lead are that it clogs the engine and may produce corrosive products. Lead removal may result in exhaust valve recession which leads to increased exhaust hydrocarbon emissions and expensive repairs, as well as increased gasoline costs. Increased aromatics used to compensate for the removal of lead may be worse than the lead, since the photochemical reactions of most aromatics can lead to the formation of peroxybenzoyl nitrate and its derivatives which are extremely potent eye irritants.

22241

APTIC NO. 41637

Pedersen, Lee A. and W. F. Libby

UNSEPARATED RARE EARTH COBALT OXIDES AS AUTO EXHAUST CATALYSTS. *Science*, 176(4041):1355-1356, June 23, 1972. 5 refs.

Unseparated rare earth oxides can be used to make inexpensive exhaust oxidation catalysts. Studies of lanthanum cobalt oxide have shown it to have chemical activity rivaling that of platinum. Cobalt oxides with the rare earths neodymium and dysprosium have been compared in catalytic activity and little difference could be found. Tests made with gas mixtures of 98.82% hydrogen and 1.18% cis-2-butene yielded 92.1% conversion of the cis-2-butene at 200 C. It is concluded that the three rare earth compounds DyCoO₃, NdCoO₃, and LaCoO₃, are similar to each other and to RCoO₃, where R is the natural rare earth mixture as mined.

22242

APTIC NO. 41790

Perga, Martin W., Ted V. De Palma, LeRoy E. Fessler, and Albert J. Brons

CATALYTIC EXHAUST CONVERTER CONSTRUCTION. (Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,649,215. 7p., March 14, 1972. 5 refs. (Appl. Sept. 18, 1969, 6 claims).

A catalytic converter is described which allows for the various components of the converter to expand and contract relative to each other as the temperature of the apparatus fluctuates. The converter encompasses a catalyst retaining bed that comprises two perforate plates supported to slide by grooved pieces. A special baffle plate in the inlet manifold section in conjunction with a tilted catalyst bed allows uniform distribution of exhaust gases through the catalyst particles. Construction of the catalytic converter permits location of the inlet to the converter to be flexible, so that the converter is adaptable for use in engine compartments of the various makes or models of automobile. (Author abstract modified)

22243

APTIC NO. 42278

Perry, R. E.

A MECHANICAL COLLECTOR PERFORMANCE TEST REPORT ON AN OIL FIRED POWER BOILER. *Combustion*, 43(11):24-28, May 1972.

To best define the performance one can expect with a mechanical collector on oil firing, a series of dust loading tests were conducted on a No. 6 oil fired boiler at Franklin Station, Rochester, Minnesota. Two of the purposes of this test were to measure actual dust loadings to and from the collector and obtain particulate size data for the dust entrained in the boiler flue gas. In addition, sufficient data were obtained to determine mechanical collector efficiency and the effect of fuel additives on this efficiency. The sampling and analytical procedures are described, as well as the completely water cooled furnace. The particulate emission rate from oil firing was low, with mechanical collectors operating at an 85-88% efficiency, indicating that an outlet loading of 0.05 lb/1,000,000 Btu is quite attainable for meeting the new Federal Guidelines on control of particulates at an investment far less than that required for cloth filters, electrostatic precipitators, or liquid scrubbers. The particulates had a high carbon content, were spherical in shape, and very porous. Operation of mechanical collectors without corrosion and plugging requires cold end temperatures greater than 300 F.

22244

APTIC NO. 41982

Perthuis, J. de

THE ACTION OF THE PETROLEUM INDUSTRY IN AIR POLLUTION PREVENTION. (*L'action de l'industrie du pétrole dans la prévention de la pollution atmosphérique*). Text in French. *Pollut. Atmos. (Paris)*, 14(54):145-148, April-June 1972.

The action of the French petroleum industry in air pollution prevention and abatement is outlined. Co-operation within the petroleum industry, as well as with other branches of industry and other countries within the framework of CONCAWE (Conservation of Clean Air and Water in Western Europe) in matters of pollution control is intensive. Systematic sulfur compound concentration and smoke measurements around petroleum processing plants are carried out. While the bulk of the crude oil processed in France has a high sulfur content, economical desulfurization of fuel oil to 0.5% of S, compared with the standard value of 0.7%, is possible. In addition, the low viscosity of such fuel oils results in a considerable decrease in unburned hydrocarbons. Thus, the sulfur dioxide emissions from domestic heating have considerably decreased for the past 10 years. The amount of sulfur recovered yearly from natural gas for sulfuric acid production totals 30,000 tons. Though intensive laboratory and pilot plant experiments on the desulfurization of heavy oil are in course, no economically acceptable solution has yet been found. Hydrogenation represents an expensive method, while the vacuum desulfurization of the distillates is regarded as promising. The removal of sulfur from waste gases at power plants is another effective method of reducing sulfur dioxide emissions. Both refinery equipment and processes have been steadily improved to reduce nuisances.

22245

APTIC NO. 41671

Pierre, George R. St

APPLICATION OF THERMODYNAMICS TO THE DEVELOPMENT OF COLLECTION SYSTEMS FOR THE CONTROL OF SULFUR DIOXIDE EMISSIONS. THE LIQUID-COPPER-SCRUBBING PROCESS. Preprint, Colorado Univ., Boulder, p. 242-262, 1971, 9 refs. (Presented at the Western Resources Conference, Golden, Colo., July 9, 1971.)

A procedure involving the use of copper as a reactant to collect sulfur simultaneously with the combustion of fossil fuel at the plant site is described. Thermodynamic calculations based on the relative stabilities of cuprous sulfide and copper oxide, and the important gaseous species composed of sulfur, oxygen, carbon, and hydrogen indicate that liquid copper is an excellent reactant for sulfur removal when the oxidizing potential of the gas mixture is maintained at low levels (equivalent to a ratio of carbon dioxide to carbon monoxide of about 10). To utilize the method, a two stage combustion system is

needed. In the first stage, the fuel is partially burned and scrubbed with copper. The cleaned gas then passes into a second combustion stage wherein additional air is introduced to develop the full calorific value of the fuel for subsequent use. It is essential to have appropriate baffles between the first and second combustion stages to prevent any carryover of copper into the second stage. The Cu/Cu₂S mixture formed in the first stage is collected in a hearth from which it can be removed for a recycling operation. The possible advantages, disadvantages, and uncertainties of the process as applied to a steam generating system are discussed. Other sulfur dioxide removal methods are listed.

22246

APTIC NO. 41112

Pless, Loren G.

SOME EFFECTS OF EXPERIMENTAL VEHICLE EMISSION CONTROL SYSTEMS ON ENGINE DEPOSITS AND WEAR. Preprint, Society of Automotive Engineers, Inc., New York, 13p., 1971, 20 refs. (Presented at the Society of Automotive Engineers, International Mid-Year Meeting, Montreal, Canada, June 7-11, 1971, Paper 710583.)

Passenger car tests were conducted to evaluate the effects on deposits and wear of three types of vehicle emissions control systems intended to reduce either evaporative emissions, oxides of nitrogen in the exhaust, or crankcase emissions. These tests used 1965-1970 model cars, operating with leaded commercial gasolines and 13 different engine oils, in several kinds of service. A crankcase storage evaporative emissions control system increased engine rusting in short trip service, and increased sludging and valve train wear in low speed, stop-and-go service. Reducing the crankcase purging rate to overcome hot starting and driveability problems with crankcase storage caused even larger deposit and wear increases. Engine rusting in short trip service was increased with exhaust gas recirculation; in other tests, heavy lead-salt deposits accumulated in the recirculation system. Doubling the positive crankcase ventilation valve idle air flow rate greatly reduced engine rusting in short trip service, and reduced engine deposits and oil oxidation in mixed city-suburban-expressway service. (Author summary modified)

22247

APTIC NO. 41919

Prasse, Herbert F.

ANTIEMISSIONS COMPRESSION PISTON RING. (Ramsey Corp., St. Louis, Mo.) U. S. Pat. 3,645,174, 7p., Feb. 29, 1972, 11 refs. (Appl. Nov. 10, 1970, 7 claims.)

Internal combustion engine emissions may be caused to a great extent by failure to burn all of the fuel injected into the engine cylinders. In a conventional piston and piston ring design, the top compression piston ring is positioned in a ring groove spaced axially from the top of the piston. This creates a circumferential crevice between the outer diameter of the piston and the cylinder wall in the area above the top compression ring. To the extent that the top compression ring does not fit snugly with the top radial wall of the ring groove, that area also forms a crevice. As the piston rises in the cylinder during the compression stroke, fuel can condense along the cylinder wall and be thrust into these crevices. Because of the small space involved, combustion may not take place in these crevices, allowing the formation of undesired emission products. A U-shaped cross section anti-emissions control ring is presented which is adapted to be positioned at the top of the ring groove with a periphery adapted to engage the cylinder wall, as well as a radial configuration adapted to seal against a radial wall of the piston.

22248

APTIC NO. 41645

Preusser, Gerhard and Martin Schulze

N-ACYLMORPHOLINES FOR THE REMOVAL OF ACIDIC COMPONENTS FROM GASES. (Verfahren zum Auswaschen von sauren Bestandteilen aus Gasen).

Text in German. (Heinrich Koppers G.m.b.H., Essen (West Germany)) W. Ger. Pat. Appl. 2,020,366. 4p., April 25, 1971. (4 claims).

Gases were freed from carbon dioxide, hydrogen sulfide, and hydrocyanic acid by passing through scrubbing solutions consisting of the N-acylmorpholines I (R equals H(II), Me, Et, or Pr) optionally at increased pressure. The scrubbing solutions were easily regenerated under reduced pressure or at increased temperature. At 80 C, 63% of the absorbed CO₂ and 79% of the absorbed H₂S were liberated from II.

22249

APTIC NO. 41085

Ranke, Gerhard, Rainer Fabian, and Wolfgang Foerg

PROCEDURE AND EQUIPMENT FOR THE PRODUCTION OF HYDROGEN AND CARBON MONOXIDE.

(Verfahren und Vorrichtung zum Gewinnen von Wasserstoff und Kohlenmonoxid). Text in German. (Linde A. G. Wiesbaden (West Germany)) W. Ger. Pat. Appl. 2,025,763. 18p., May 26, 1970. (5 claims).

Hydrogen and carbon monoxide are recovered by cracking carbon (1-3) hydrocarbons, cooling the cracked gases during CO condensation, and removing the remaining gaseous CO by absorption at low temperatures. The hydrocarbons for cracking are partially cooled and liquified to remove nitrogen by fractional condensation and higher hydrocarbons, carbon dioxide, carbonyl sulfide, and hydrogen sulfide by low temperature rectification. The liquid is supercooled and is used to wash the CO from the cracked gas. The liquid hydrocarbon charged with CO, after it is vaporized and heated, is used as the raw material for the cracking process.

22250

APTIC NO. 42796

Remick, Cassius D.

ELECTRICAL PRECIPITATOR. *(Electrohome Ltd., Waterloo (Ontario)) U. S. Pat. 3,654,747. 4p., April 11, 1972. 14 refs. (Appl. Dec. 11, 1969, 3 claims).*

A cabinet-type electrical precipitator is provided in which the electrodes are particularly easy to access. The precipitator comprises a base member and two electrically non-conductive plate members projecting from and fixed to the base member. The first and second plate members are spaced substantially parallel to each other, with their edges remote from the base member and defining a plurality of spaced fingers. One electrode consists of a wire wound back-and-forth between projecting resilient fingers of insulative material, while the other electrode is made up of conductive plates interposed between the adjacent reaches of the wire. All the plates are in electrical communication with one another. The door closure includes a switch controlling the energization of the electrodes such that the circuit is broken immediately as the door opening procedure is initiated. (Author abstract modified)

22251

APTIC NO. 42150

Renault, Philippe and Henri Gruhier

PROCESS FOR PURIFYING A GAS CONTAINING HYDROGEN SULFIDE WITH PRODUCTION OF SULFUR. *(Inst. Français du Pétrole des Carburants et Lubrifiants, Paris (France)) U. S. Pat. 3,658,477. 4p., April 25, 1972. 4 refs. (Appl. Sept. 5, 1968, 8 claims).*

A process is described for converting hydrogen sulfide to sulfur by means of an oxygen-containing gas such as air, in the presence of alkanolamines. These solvents exhibit the particular advantage of being substantially insoluble in water. Alkanolamines which are highly soluble in the phosphoric esters, such as the N-methyl diethanolamines, are preferred. The ester is by itself a good solvent for H₂S, but absorption is improved when the process is carried out under increased pressure. The used amine improves the purification of the gas, particularly when the partial pressure of H₂S is low. A temperature between 20-50 C is recommended. The gas which is mostly free of H₂S is removed; the solution which issues at

the base of the first column is usually subjected to a pressure release and then introduced into another column where H₂S is oxidized to sulfur by means of bubbling oxygen or air.

22252

APTIC NO. 41151

Riha, K.

DEEP LANCING WITH OXYGEN TO REDUCE EVOLUTION OF BROWN FUMES IN THE OXYGEN OPEN-HEARTH PROCESS. *Hutnik (Prague), 19(7):246-259, 1969. 5 refs. Translated from Czech. British Iron and Steel Industry Translation Service, London (England), 14p., May 1970.*

A newly designed oxygen lance for blowing oxygen into the metal bath in an open-hearth furnace to reduce brown-fume generation is examined. The fumes, actually dusts containing large amounts of iron, were reduced by 65% during the melting process and by 40% during the entire open-hearth process. The new lances blow oxygen in a horizontal direction deep in the molten metal rather than almost vertically into the metal. In addition to reducing the output of dust, the new lances offer lower oxygen consumption, reduced consumption of refining additives, lower fuel consumption, increased output from the furnace because of shorter melting and finishing periods, and reduced wear and tear on the furnace lining.

22253

APTIC NO. 41807

Ririe, Otis E.

SAMPLE SCRUBBER. *(Phillips Petroleum Co., Bartlesville, Okla.) U. S. Pat. 3,643,406. 3p., Feb. 22, 1972. 7 refs. (Appl. Feb. 18, 1970, 5 claims).*

Previous vapor cleaning apparatus associated with chromatographic analyzers generally used a column containing packing materials, filters, and somewhat complex cooling devices. These columns became fouled with the contaminants of the vapor stream and required frequent cleaning. The cooling apparatus was expensive to operate and maintain. An apparatus is described for breaking up, cooling, and water scrubbing solids and oils from a sample vapor stream. Since it does not contain packing material or filters, it requires less maintenance than the previous devices. The apparatus is constructed in such a way that fluids entering the chamber at about equal volumetric rates of approximately 1000 cc/min will be confined to an area of unit length which will promote a desirable turbulence, cause effective scrubbing for solid and oil removal, and break up the vapor stream. (Author abstract modified)

22254

APTIC NO. 41981

Robin, A.

THE ACTION OF ELECTRICITE DE FRANCE IN AIR POLLUTION PREVENTION. *(L'action J.E.D.F. dans la prevention de la pollution atmosferique). Text in French. Pollut. Atmos. (Paris) 14(54): 137-141, April-June 1972.*

The contribution of Electricite de France to air pollution prevention is outlined. Dust emissions from coal-firing power plants are controlled by electrostatic filters with efficiencies exceeding 99%, while high stacks (above 100 m) provide favorable dispersion conditions. Though there are no satisfactory methods for removing sulfur dioxide from the smoke of fuel oil-powered power plants, the use of low-sulfur oil, particularly in cases of emergency, as well as of very high stacks (220-240 m), help abate SO₂ levels. The respective sulfur contents of heavy and low sulfur oils consumed by power plants in France are about 2.5% and less than 1%. While nuclear power plants will be built in increasing number, the role of thermal power plants is expected to decline from the 1980's. Though the present background radioactivity would not be affected even by a total changeover to nuclear energy, nuclear and thermal power plants alike cause problems insofar as they heat their environment. Studies of cooling processes will be conducted over the next 30 to 50 years. Prototypes of electric cars, able to cover a minimum distance of 75 km, are being

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tested successfully. Such battery-driven models could not replace their conventional counterparts, but fuel cell powered cars, expected to appear in the next 15-20 years, are predicted to be promising.

22255

APTIC NO. 42300

Rogers, Joe E

SMOG CONTROL DEVICE FOR INTERNAL COMBUSTION ENGINE. (Assignee not given.) U. S. Pat. 3,656,460. 4p., April 18, 1972. 8 refs. (Appl. Sept. 17, 1970, 8 claims).

While the prior devices for controlling emissions from internal combustion engines have been partially successful, they have suffered from several deficiencies. First of all, many of the devices of the prior art operate only at either high or low engine vacuum, but not at both, thus giving incomplete emission control. It also has been necessary to include valves and other moving parts in engine smog control devices, thus making their initial cost high and creating a maintenance problem. A smog control device for an internal combustion engine is described which utilizes a first conduit which communicates the engine crankcase with the suction head of the engine to draw gases accumulating in the crankcase when the suction head is maximized. A second conduit which communicates the engine crankcase with the air passage leading into the engine draws gases accumulated in the crankcase in response to the flow of air through the air passage. A third conduit communicates the engine crankcase with the atmosphere to supply a flow of fresh air to the crankcase whenever gases are flowing through either of the first or second conduits to thereby prevent any vacuum or crankcase pressure balance in the engine. The conduits are arranged to cooperate in maintaining a perfect pressure balance in the engine at all times without the need for any valves or other moving parts. To promote the efficient combustion of fuel and thereby further reduce the accumulation of gases in the engine crankcase, a fuel additive in the form of burned exhaust gases is introduced into the engine at the inlet of the air passage. This additive also permits the engine to run on unleaded gasoline. (Author abstract modified)

22256

APTIC NO. 41806

Ronning, Richard L.

METHOD AND APPARATUS FOR ENHANCING THE SEPARATION OF PARTICULATE MATERIAL FROM AN EFFLUENT STREAM. (Assignee not given.) U. S. Pat. 3,643,404. 4p., Feb. 22, 1972. 12 refs. (Appl. Jan. 28, 1959, 10 claims).

A method and apparatus are presented for minimizing the particulate material content of an effluent gas stream by enhancing the efficiency of centrifugal separation. A conduit feeds a stream of cooling gases into the separator to cool the effluent stream closer to its dew point. Condensing moisture collects on the particles, augmenting the mass of each particle so that separation by centrifugal force is enhanced. The apparatus can be economically fabricated and installed in existing dehydration plants with a minimum of alteration to such equipment. (Author abstract modified)

22257

APTIC NO. 41027

Salvi, G

EXHAUST CONTROL SYSTEMS: DEVELOPMENTS AND TRENDS. (Sistemi di controllo dei gas di scarico: sviluppi e tendenze.) Text in Italian. Riv. Combust. (Milan), 26(2):33-72, Feb. 1972. 41 refs. (Presented at the Congresso Nazionale A.T.A., Milan, Italy, Nov. 22-24, 1971.)

Reference is briefly made to the most important system for the control of gasoline engine exhaust gases currently being investigated by the U. S. automobile industry. There are still some difficulties in the development of these systems, which are based on thermal and catalytic afterburning, or on partial

recycling of exhaust gases for nitrogen oxides. A report is also given on the work being conducted at the Stazione Sperimentale per i Combustibili in Italy on the development of an emission control system designed differently than those being studied in the U. S. This system makes use of two afterburners in series, one thermal and the other catalytic, and calls for the engine cylinders to be split into two groups. One group is fed a rich mixture and the other by a very lean mixture, with a charge closely resembling the stratified type. Carbon monoxide hydrocarbons, and nitrogen oxides can be reduced.

22258

APTIC NO. 41947

Sasaki, M., S. Takemichi, E. Ishiyama, S. Morimoto, and T. Kuwajima

THE PERFORMANCE CAPACITY OF OIL ADDITIVES FOR DETOXICATION OF OIL BOILER COMBUSTION GAS. (Jûjû boira nensho haigasuchu no yugai seibun ni oyoboru juyû tenkazai no seino.) Text in Japanese. Hokkaidoritsu Kogyo shikenjo Hokoku (Rep. Hokkaido Prefect. Ind. Exp. Stn.), no. 177:3-12, 1971.

Five commercial oil additives were analyzed for the compositions and sludge dispersions, and tested for the inhibiting effects on harmful gases using a small boiler for the combustions. An additive which contained several organic components and one which contained 18.3 g oz magnesium oxide in every 100 ml of kerosene as oil additive showed poor sludge dispersions. Two additives containing metal carbonates were found to have large effects on sludge dispersions. A boiler with a capacity of 6000 Kcal/hr and a heat transfer surface of 0.8 sq m was used for the tests of the effects of the oil additives at a condition of oil supply 4.5 to 6.1 kg/hr, air/oil ratio 1.64 to 2.04, and additive concentration 1/500 to 1/1000 by volume. Results showed that none of the five oil additives had a sulfur dioxide inhibition effect, and the formation of sulfur trioxide depended on the air/oil ratio and the amount of combustion. At a low air/oil ratio and small amount of combustion, magnesium hydroxide, aromatic amine, and manganese carbonyl complex inhibited SO₃ formation, whereas magnesium carbonate and manganese carbonate did not show any effect. The nitrogen oxides concentration was 83 to 140 ppm, and no effect from air/oil ratio, the amount of combustion, or additive was observed.

22259

APTIC NO. 41565

Sato, Keiichi

WET AND DRY DUST COLLECTION SYSTEMS MANUFACTURED BY MITSUBISHI CHEMICAL ENGINEERING CO. LTD. (Mitsubishi Kakoki (Kabu) Sei shishiki, kanshiki shujin sochi ni tsuite.) Text in Japanese. Osaka no Sora (Sky Osaka), no. 14:28-32, March 1972.

Wet and dry type dust collectors are usually used for collecting dusts 0.5 to 5 micron in size. In a wet type dust collector, dust is removed while gas contacts the water. New dust collectors produced by the Mitsubishi Chemical Engineering Co. are described. A spiral wet dust collector diminishes the mechanical loss and the sticking of dust due to the curved surface. Various models of this type, different in the way of dust discharge, are listed. The gas treating capacities range from 20 cu m/min to more than 1000 cu m/min. A square type wet dust collector with special gas guiding panels that lead gas into water vertically at high speed and passing mist separator have the advantages of simple adjustment and complete moisture separation. The capacities of this type of dust collector range from 21.0 to 467.0 cu m/min. Dry type dust collectors with Luhr filters have a high collection efficiency. Their other advantages include small size and long life of the filter cloth. Gas coolers for dry type dust collectors are also listed.

22260

APTIC NO. 42104

Schmid, Otto

A NEW TYPE OF SCRUBBER AND WET DUST COLLECTOR DESIGNED FOR THE CHEMICAL INDU-

TRY. (Ein neuartiger Gaswaescher und Nassentstauber fuer die chemische Industrie). Text in German. Chem. Technik. (Berlin), 1(5):227-229, 1972.

The high efficiency scrubber and wet dust collector designed for the separation of solid and liquid particles and of noxious gases and vapors atomizes the washing liquid without the use of jets so that water and viscous liquids can be used for scrubbing. The equipment consists of a compact cylinder enclosing a preliminary filter for coarse particles, a washing zone for fine dust, a drip catcher for dust-laden droplets, and an exhaust fan; a detached settling tank is advantageous. The gas enters the cylinder tangentially above the conical bottom where coarse particles are separated by centrifugal force on the inside wall which is washed continuously by the washing liquid. Atomization of the washing liquid is accomplished by an electrically propelled, rotating, vertical atomizing wheel. The special construction of the wheel disperses the fog formed all the way to the cylinder walls, leaving no gaps. The gas passes through the fog zone at a moderate speed to achieve intimate contact with the washing liquid. The dust laden droplets are thrust by centrifugal force against the cylinder wall, flow down, and leave the cylinder through a discharge neck in its conical bottom. The purified gas is drawn through a suction tube by suction produced by a fan situated in the upper part of the cylinder and discharged. A pump provides for the circulation of the washing liquid between the settling tank and the scrubber. The contact-time between gas and washing liquid is 20 times longer than in the venturi scrubber and hydrochloric acid, hydrofluoric acid, sulfur dioxide, and odors can, therefore, be removed simultaneously from waste gases. To increase the effectiveness of the scrubber, several atomizing wheels can be installed coaxially within the cylinder without substantial loss of gas pressure due to its flow velocity. The danger of dust explosion within the open scrubber is lessened in comparison with closed system scrubbers, but a safety valve is provided. Pressure loss is 85 to 100 mm H₂O.

22261

APTIC NO. 41640

Schmidt, Rudolf

TWO-PHASE COUNTER-FLOW AND MASS TRANSFER IN SOLID BEDS. CONTRIBUTION TO THE ADVANCE CALCULATION OF PACKED COLUMNS. (Zweiphasengegenstrom und Stoffaustausch in Schmeltschichten. Beitrag zur Vorausberechnung von Füllkörpersäulen). Text in German. VDI (Ver. Deut. Ingr.) Forschungsh. Düsseldorf, no. 550, 32p., 1972, 151 refs. (Presented at the Arbeitssitzung des Ausschusses Thermische Zerlegung von Flüssigkeitsgemischen of the VTG, Tutzing, West Germany, June 3, 1971.)

An extensive investigation of the two-phase liquid-gas counter-flow through solid beds consisting of Raschig rings resulted in the establishment of methods for the calculation of the pressure losses in the gaseous phase, for the liquid holdup in the packed bed, for the wetted particle surface, the particle surface exposed to the gas stream, and for the interfacial surface as functions of the gas and liquid loads. Charts with families of characteristic curves have been determined by means of computer programs for various systems and different working conditions. These charts cover the total range of gas and liquid loads which is limited by the lower and the upper borders of load capacity. The proposed methods also furnish the distribution of the mass exchange resistance between the single phases. The calculated charts with characteristic curves allow for the optimization of packed towers.

22262

APTIC NO. 42152

Schneider, Raymond T., James A. Taylor, and William D. Willis

PROCESS FOR REMOVAL OF SULFUR DIOXIDE FROM GAS STREAMS. (Wellman-Lord, Inc., Lakeland, Fla.) U. S. Pat. 3,653,812, 8p., April 4, 1972, 5 refs. (Appl. July 18, 1969, 23 claims).

An improvement in a sulfur dioxide removal process is described, wherein a SO₂-containing gas is contacted with an aqueous absorbing solution of a metal sulfite such as sodium sulfite, to yield a spent absorbing solution of metal bisulfite. The latter is subjected in a desorption zone to a temperature, pressure, and residence time sufficient to decompose the bisulfite to the sulfite, SO₂, and water. The water and SO₂ are evaporated and the sulfite precipitated from solution. The precipitated sulfite is separated from its mother liquor and dissolved in water; the resultant solution is recycled as fresh absorbing solution. The improvement involves recycling to the desorption zone the major portion of the mother liquor from which the precipitated sulfite has been separated. (Author abstract modified).

22263

APTIC NO. 40960

Schumann, John L., John W. Schindeler, and Milton Rosen

PULSE-OPERATED ELECTROSTATIC PRECIPITATOR. (Belco Pollution Control Corp., Paterson, N. J.) U. S. Pat. 3,641,740, 4p., Feb. 15, 1972, 17 refs. (Appl. July 9, 1969, 3 claims).

In electrostatic precipitators, performance is influenced by the amplitude of the voltage which can be impressed on the dust-laden gas. The amplitude of the voltage which can be impressed on a well-aligned electrostatic precipitator largely depends on the gas and dust conditions between the electrodes but is also dependent on the frequency, duration, and amplitude of the voltage pulses applied to the electrodes. An electrostatic precipitator is provided which operates at peak voltage pulse amplitudes which approach or exceed the arcing voltage to enhance the efficiency of dust collection. The invention contemplates a system for transmitting controlled electrical energy pulses to an electrostatic precipitator which comprises a source of DC energy which is connected, via a unidirectional-current conduction means, to an electric charge accumulating means. An electric pulse controlled rectifier switching means periodically connects the charge accumulating means to the primary winding of a step-up transformer whose secondary winding is connected to the discharge electrode of the precipitator.

22264

APTIC NO. 41544

Schwind, Gene F.

ENGINE CRANKCASE EMISSION CONTROL: MORE THAN CLEANER AIR. Mater. Handling Eng., 27(4):106-108, April 1972.

The engine ventilation/filtration system used in fork lift trucks has wide applicability in industry. The unit is a filter/condenser metering unit that takes the place of positive crankcase ventilation. A condensation filter jar separates the crankcase vapors into steam, light ends of oil, and unburned fuel for recycling through the intake manifold. Sulfur trioxide, lead sulfate, iron oxide, ash, and fine metal powder are collected. The location of the input between the carburetor and the engine produces a very lean mixture and low emissions during idle and provides benefits in top end lubrication, removing carbon deposits, reducing nitrogen oxides, reducing carbon monoxide 70 to 90% promoting longer sparkplug life, more compression, and sometimes an increase in power. Installing engine ventilation on oil engines has often resulted in a return to design specifications.

22265

APTIC NO. 42151

Scott, Harold W. and Avery B. Smith

AIRBORNE CONTAMINANT REMOVAL BY ELECTROPHOTOIONIZATION. (Resource Control, Inc., West Haven, Conn.) U. S. Pat. 3,653,185, 9p., April 4, 1972, 16 refs. (Appl. Oct. 8, 1968, 2 claims).

Apparatus and a method are disclosed for reducing or removing particulate solid matter as well as adsorbed gaseous contaminants from a main stream of gas. The removal is effected

by the combined action of a high intensity electrical field and electromagnetic radiation on the gas stream, in order to cause electrostatic precipitation of solid contaminants and electrochemical and photochemical transformation of gaseous contaminants to an elemental or non-contaminant form. The field is induced by oppositely charged electrodes causing excitation of the particulate and gaseous contaminants to a state or condition causing dark current flow and/or glow discharge between the electrodes while avoiding field disrupting arc discharge. The fluid is subjected to electromagnetic radiation concurrent with such high voltage excitation, producing photoionization to sustain the electrochemical and photochemical transformation. (Author abstract modified)

22266

APTIC NO. 41536

Shah, I. S.

MGO ABSORBS STACK GAS SO₂. *Chem. Eng.*, 79(14):80-81, June 26, 1972.

A process for removing sulfur dioxide from flue gases, using magnesium oxide as the absorbent, is described. Flue gas containing SO₂ enters a venturi scrubber and contacts the absorbing liquor, a slurry of MgO and recycled magnesium sulfite and sulfate. The bleed from the absorption system enters the centrifuge where hydrated crystals of MgSO₃ and MgSO₄ and unreacted MgO are separated from the mother liquor. The liquor is returned to the absorber, and centrifuged wet cake enters the dryer. Anhydrous crystals from the dryer are sent to a separate calcinating plant. The reactions are: MgSO₃ + heat yields MgO + SO₂, and MgSO₄ + 1/2 C yields MgO + SO₂ + 1/2 carbon dioxide. The flue gas leaving the calciner contains 15 to 16% SO₂ and is sent for 98% sulfuric acid production. The process is evaluated economically along with methods of achieving low-sulfur fuel.

22267

APTIC NO. 42153

Shah, Indravan S.

REMOVAL OF SULFUR DIOXIDE FROM GAS STREAMS. (Chemical Construction Corp., New York) U. S. Pat. 3,653,823, 5p., April 4, 1972, 12 refs. (Appl. Feb. 27, 1970, 6 claims).

A process is provided for the removal of sulfur dioxide from a gas stream, such as waste or tail gas from a chemical process, flue or stack gas from a steam power boiler, or any gas stream generated by the combustion of a sulfur-containing fuel. The gas stream containing SO₂ is scrubbed with a circulating aqueous slurry containing solid magnesium oxide and magnesium sulfite, at a relative slurry to gas flow rate in the range of 0.7 to 7.0 l/cu m of gas. The temperature of the slurry is maintained in the range of 20-95°C by external cooling so that magnesium sulfite is principally present in the hydrated crystalline form. The pH of the slurry is maintained between 5.5 and 9.5 by the controlled addition of makeup magnesium oxide to the circulating slurry. A portion of the circulating slurry is withdrawn for regeneration, and is controlled to about 1-3% of the total circulating slurry. The withdrawn portion is centrifuged or filtered, dried, and then heated to evolve a SO₂-rich gas stream and regenerate magnesium oxide which is recycled to the circulating slurry. The SO₂-rich gas stream is processed to recover sulfur or a suitable sulfur-containing compound.

22268

APTIC NO. 41960

Skomoroski, Robert M.

IRIDIUM ELECTROPLATING. *International Nickel Co., Inc., New York* U. S. Pat. 3,639,219, 3p., Feb. 1, 1972, 1 ref. (Appl. Dec. 24, 1969, 4 claims).

Iridium plated stainless steel screen exhibits good catalytic activity in experimental anti-pollution devices for automobiles. An iridium electroplating bath is prepared by digesting an aqueous solution of iridium trichloride and sulfamic acid in a molar ratio of sulfamic acid to iridium of at least 7 at 100°C

for an extended period of time then adjusting the iridium content of the bath to about 3 to 20 g/l, adding about 3 to 20 of ammonium sulfamate and electrodepositing iridium from the bath upon a conductive substrate with a bath pH of about 1 to 7 (adjusted by ammonia additions) and at a temperature of about 50 to 75°C with insoluble anodes and a cathode current density of about 0.1 to 8 amperes/sq decimeter to produce adherent crack-free iridium deposits. Substrates which may be electroplated with iridium in accordance with the invention include nickel-base alloys, mild steel, copper, brass, gold, and iron-nickel-cobalt alloys.

22269

APTIC NO. 41208

Smaylis, V. I.

RECIRCULATION OF EXHAUST GASES AS A MEANS OF REDUCING THE EJECTION OF OXIDES OF NITROGEN BY DIESEL ENGINES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopymi Gazami Avtomob., Proc. Symp., 2nd, 1971, 9 refs. Translated from Russian, 15p.*

The by-passing of some of the exhaust gases into the diesel engine intake is described to sharply reduce toxic emissions with minimum deterioration in engine fuel economy. The method involves the substitution of a corresponding volume of exhaust gases from the preceding cycle for the excess air in the fresh charge. The result is to reduce the flow of air and the quantity of exhaust gases discharged by the engine to the atmosphere. There are two ways to replace some of the air: artificially increase the residual gases in the cylinder, or return some of the intake air. Experimental data indicate reduced emission of nitrogen oxides by at least a factor of 5 to 10 compared with the same general-purpose diesel engine.

22270

APTIC NO. 41811

Snelling, James W.

METHOD AND APPARATUS FOR POLLUTION FREE BURNING OF AUTOMOBILE BODIES. (Amex Corp., Las Vegas, Nev.) U. S. Pat. 3,646,897, 6p., March 7, 1972, 8 refs. (Appl. April 23, 1970, 18 claims).

A low cost means is provided for reducing the contaminants released in the atmosphere by burning disposed automobile bodies. The method contemplates moving the vehicle into a module for burning, and igniting it prior to or subsequent to entry. Smoke and gas pass upward through an opening in a pair of metal sheets. The gas then is washed as it passes around a baffle, subsequently is washed again, and is withdrawn through a chimney. The water is reclaimed, the sediment removed and the water reused.

22271

APTIC NO. 41646

Snoek, Jacobus and Jaap Erik Naber

CONTROL OF A SULFUR RECOVERY PROCESS. (Verfahren und Vorrichtung zum Steuern eines Schwefelgewinnungsverfahrens). Text in German. (Shell Internationale Research Maatschappij N. V., The Hague (Netherlands)) W. Ger. Pat. Appl. 2,125,896, 18p., May 25, 1971, (10 claims).

Sulfur is recovered in a process for regenerating a sulfur-containing catalyst. The catalyst is copper oxide on a carrier of aluminum oxide or silica such as is used to purify stack gases of sulfur. The catalyst contaminated with copper sulfate is treated in a regenerator with a reducing agent such as hydrogen gas to produce copper metal and the effluent gas contain approximately 33% sulfur dioxide and 66% by volume water. Sulfur is recovered from the effluent by the Claus process where two moles of hydrogen sulfide one mole of SO₂ yields three moles of S and two moles of H₂O. ^{1/2}

22272
Sociotti

AIR AND WATER POLLUTION DEVELOPMENTS IN THE CHEMICAL INDUSTRY. *Scand. Chem. Eng. Congr., 2nd, Copenhagen, Denmark, 1971. 5 refs. (Presented at the Scandinavian Chemical Engineering Congress, 2nd, Copenhagen, Denmark, Nov. 2-4, 1971.)*

Improved air and water pollution abatement devices in the chemical industry involve alternate methods of production, improvements in the conversion and reuse of reagents, concentration and disposal of by-products through circulation, and waste gas and waste water treatment. The common method of phenol manufacture produces acetone and phenol without and by-products, and is an ideal example of a high yield, low pollution system. However, double contact hydrochloric acid process allows 99.7% conversion, but is considerably more expensive than the older single plants that consistently convert 90%. The Frasch-Hooker process for phenol production recycles hydrochloric acid with no waste. Waste water disposal can be improved both ecologically and economically. Also, the use of double sewage systems, air and evaporative cooling, surface condensers, recirculation and vacuum distillation. Work is in progress on methods to reduce the emissions of sulfur dioxide and nitrogen oxides. A method of NOx reduction with methane shows promise. Until proper pollution abatement technology is available, it will be necessary to exert stringent controls on chemical plant site selection.

22273

APIC NO. 42088

Soria, Alberto Olague, and A. elio Martinez Sanchez.

APPARATUS FOR PURIFYING GASES. (Assignee not given.) *U. S. Pat. 3,648,311 Apr. 14, 1972. 6 refs. (Appl. M. 5,119,190. 1 claim.)*

An apparatus is described for removing impurities and noxious materials from exhaust gases generated by the combustion of fuels. The gases are passed through an agitation chamber containing an adsorbent liquid and provided with agitators for extraction of the impurities and noxious materials. The nature of the impurities to be removed is considered and the adsorbent liquid is selected from those materials which will effectively absorb and neutralize the impurities present. (Author abstract modified.)

22274

APIC NO. 41069

Stankiewicz, W.

IRON & NICKEL CASTING CENTER. (Die neue und die alte in Flat Rock, Michigan, USA.) *Gieserei (Pawelchuk), no. 1240-133, April 20, 1972. 5 refs.*

The largest iron foundry in the world is being put into operation at present in Flat Rock, Mich. The casting center will have six 50 short ton electric arc furnaces, each capable of producing 10 to 15 short tons of iron per hour, and five 80 ton electric ladles for five molding lines. The dust from the furnaces is collected by the world's largest bag house 300 ft long by 67 ft wide. Bags are shaken mechanically by a timed device, and the dust is conveyed into a unit which pelletizes the dust into small balls ready to be taken to the solid waste disposal area. In the total core room of 54,000 sq ft there are 30 independent exhaust systems with the total capacity of 1.34 million cu ft/min. One large baghouse-type dust collector for the five mold lines which consists of 150 compartments is approximately 450 ft long and has the capacity of collecting and filtering 1.27 million cu ft/min.

22275

APIC NO. 41084

Stecchi, Virginio, Carlo Morsiani, Antonio Cavallaro, and Dario Vio.

GAS SCRUBBER WITH CLEANING COLUMN FITTED WITH A TRANSVERSE WASH GRATE. (Vorrichtung zum Anwaschen von Verunreinigungen aus einem Gas.) *Verfahren in German. (Montecatini Edison S.p.A., Milan (Italy))*

AIR POLLUTION ABSTRACTS, SEPTEMBER 1972

W. Ger. Pat. Appl. 1,955,541. 8p., Nov. 5, 1969. 5 refs. (1 claim.)

A gas scrubber has been developed which has a vertical column through which the gas is passed and in which a transverse grating is set. A liquid nozzle directs a stream at the center of the grating which wets the entire grating. The surface area of the radial spokes of the grating is under 70%, preferably 20 to 70% of the entire surface area of the grating. The size and number of the spokes are chosen so that the liquid travels parallel to them, thus forming a film transverse to the gas flow. Soot particles may be removed with this scrubber. Preferably the spokes are circular and run towards the grate center radially at between 5 and 15 deg.

22276

APIC NO. 41519

Stockham, John

SULFUR DIOXIDE REMOVAL. *Midwest Eng., 24(6):4-6, 17, March 1972.*

Electrical power generation accounts for about 46% of the sulfur oxide emissions on a nationwide basis. Nuclear fueled plants will only meet a small portion of the power demand during the remaining years of the century. Legal restrictions on the sulfur content in fuels have limits lower than can be met by present desulfurization methods. The removal of SOx from stack gases has become a more attractive alternative control measure for the power industry than the use of low sulfur fuels. Chemical reactions that capitalize on the reactivity of SO2 can be employed to recover elemental sulfur, sulfuric acid, or ammonium sulfate. Catalytic systems have been reported with efficiency as high as 90%. Wet scrubbing appears to be more efficient and more expensive than dry scrubbing. Processes that reclaim dilute sulfuric acid or ammonium sulfate are not as economical as those that produce elemental sulfur or concentrated sulfuric acid. All by-product markets fluctuate, and processes that produce elemental sulfur which may be stockpiled are the most desirable.

22277

APIC NO. 42113

Sugiyama, Isoko, Kunitaro Katozoe, Kyoko Yamamoto, and Michiharu Seki.

EFFECT OF PARTICLE SIZE OF THE ACTIVATED CARBON PILLETS ON THE RATE OF SULFUR DIOXIDE OXIDATION. (Nisanka to no kassentan yunao kakusan to sanko nanno sokudo.) *Text in Japanese. Nippon Kagaku Kaishi (J. Chem. Soc. Japan) no. 6:1052-1058, June 1972. 4 refs.*

The influence of sulfur dioxide in the pores of activated charcoal upon the rate of SO2 oxidation was examined. Using the apparent rate constant measured for each particle size of the carbon, the effectiveness factor of the particle and the effective overall diffusion coefficient of SO2 were determined. The influence of the concentration of oxygen or water on the intrinsic reaction rate constant was also determined at various temperatures. The reaction rate for any particle size and for various concentrations of each gas at a certain temperature can be estimated, if the properties of the activated carbon, namely pore volume and pore size distribution, are known and the intrinsic reaction rate is measured at this temperature. (Author abstract modified.)

22278

APIC NO. 42000

Suzuki, H. and T. Kawata.

ON DUST COLLECTOR OF COAL CHARGING CAR AND COKE DISCHARGING CAR. (Solomshi jigohi koku haishutsusha no shupunki m tsuite.) *Text in Japanese. Netsu Kumi (Heat Management, Energy, and Pollution Control), 24(3):15-21, March 1972.*

Dust collector designs and application to coal charging cars and coke discharging cars are examined. Three coal charging cars were equipped with combustion type dust collector with a capacity of 200 cu m/min, and one with two non-combustion

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type dust collectors, with a capacity of 63 cu m/min each. The combustion type collector was equipped with a lighting system and a burner. During coal charging, particulates and smoke were burned and sent to the pre cleaner where larger particles were removed. The lighting system consisted of a propane and a spark-controlling circuit. Efficiency greater than 90% could be obtained provided the dust collector was well maintained.

22279

APTIC NO. 41053

Takahashi, Teruo

GAS TREATMENT TOWARD POLLUTION CONTROL AND THE FUTURE TREND. (*Kogai taisaku to shite no gasu shori to kongo no doko*). Text in Japanese. *Bunseki Kiki (Analysis Instr.)*, 10(3):188-197, March 1972. 34 refs.

Air pollutants and emission sources are briefly reviewed and control methods are discussed. As control measures, organization of monitoring systems, the use of dust collectors, deodorization, selection of fuels and improvement of combustion methods, desulfurization of oil, dilution of combustion gas in the flue, improvements of stack height, centralization of area's heating and cooling systems, countermeasures for automotive exhaust gases, and treatment of toxic gases are discussed generally. The treatment of toxic gases includes the use of lime or dolomite, the alkali-alumina method, manganese method, activated carbon method, and catalytic oxidation method.

22280

APTIC NO. 42196

Tanaka, Osamu, Kenkoku Azuma, Naotoshi Mitsunaga, Mitsuko Ohkawa, and Akihiko Shimojima

PLATE-FIN TYPE AIR CLEANERS. (*Preto fin-gata kuki seiojikki*). Text in Japanese. *Mitsubishi Denki Gihō (Tokyo)*, 46(5):576-584, 1972. 6 refs.

Plate-fin type air cleaners employ a chemical method of eliminating air pollutants. The cleaner is equipped with a unique wet filter having very slight pressure drops across it. The effective life of the filter is twenty times that of a filter equipped with an unwoven mat or an active charcoal filter at the same pressure drop of air current. This new device is capable of removing, with an efficiency of better than 99%, the sulfur oxide that is a representative air pollutant. When the filter is moistened with an aqueous solution of glycerin containing potassium carbonate and sodium molybdate, the set can remove hydrogen sulfide, which has a strong odor and corroding action on precision machines, such as electronic computers. (Author abstract modified)

22281

APTIC NO. 41558

Tanasescu, T. and V. Istodor

CONSIDERATIONS CONCERNING THE CALCULUS AND EFFICIENT USE OF CYCLONES. (*Consideratii privind calculul si utilizarea eficienta a ciclanelor*). Text in Rumanian. *Rev. Chim. (Bucharest)*, 21(4): 240-245, April 1972. 10 refs.

Basic factors affecting the design and selection of centrifugal dust separators are reviewed. Included are sketches describing the operating principles, the types of inlets, and the different models of cyclones. The limiting particle size diameter referred to as the solid particle size providing a 50% separation efficiency of the facility constitutes one of the main factors in determining the design of cyclones. Maximum operating efficiency of the facility can be achieved by using minimum cyclone diameters, maximum rotation figures and dust carrying gas flow rates at the inlet into the cyclone, and minimum gas temperatures providing minimum dynamic viscosities. The separating efficiency of the system increases with the density of the suspended particulates. Graphs describing the variation of the efficiency with the dust particle size are included. The selection of the type of cyclone for given conditions is determined by the investment and operating expenditures and the space requirements for the achievement of predetermined separating efficiencies.

22282

APTIC NO. 41924

Tatsutomi, Yasuo and Yoshihiro Kajihara

TEMPERATURE COMPENSATING CONNECTION BETWEEN EXHAUST PURIFIER AND PIPE. (*Toyo Kogyo Co., Ltd., Hiroshima (Japan)*) U. S. Pat. 3,645,092. 4p., Feb. 29, 1972. 4 refs. (Appl. April 1, 1970. 5 claims).

A reactor outlet pipe of a multilayer construction is described wherein an inner wall, which is movable in relation to an outer wall, supports a reactor inner shell which is movable in relation to an outer shell to ensure that exhaust gas in the reaction chamber is led to the exhaust pipe without leaking due to a differential thermal expansion. In previous reactors used for purifying exhaust gas, the inner and outer shells were rigidly fixed so that if there developed a difference in thermal expansion of the shells, their end portions tended to separate from their mountings or the two shells were apt to crack.

22283

APTIC NO. 41925

Templin, Robert J., Paul R. Johnson, and Robert F. Fairberg

EXHAUST EMISSION CONTROL. (*General Motors Corp., Detroit, Mich.*) U. S. Pat. 3,645,098. 8p., Feb. 29, 1972. 6 refs. (Appl. Sept. 28, 1970. 11 claims).

Catalytic converters and thermal reactor exhaust manifolds are relatively inefficient at ambient temperatures; the thermal mass of the reaction devices cannot be warmed to an efficient reaction temperature instantaneously. In the present invention, internal combustion engine exhaust gases, passing unreacted through a catalytic or thermal reaction device, are directed to an expandable container which retains the entire flow of exhaust gases. The container comprises a plurality of filter, adsorptive, and absorptive media for separating and storing undesirable exhaust gas constituents. After warmup of the reaction device, the retained gases or constituents are recirculated to the engine induction system or the reaction device. (Author abstract modified)

22284

APTIC NO. 42162

Thabaud, J.

THE ROLE OF THE TECHNICAL AUTOMOBILE UNION IN AIR POLLUTION CONTROL. (*Le rôle de l'U.T.A.C. dans la lutte contre la pollution atmosphérique*). Text in French. *Pollut. Atmos. (Paris)*, 14(54):169-171, April-June 1972.

The role of the U.T.A.C. (Union Technique de l'Automobile, du Motocycle et du cycle) in air pollution control is outlined. The U.T.A.C. participated in the elaboration of the European cycle, and carried out tests on automobiles and exhaust control devices. Recent studies are centered on the separation of exhaust hydrocarbons into principal classes, rapid sampling methods for studying hydrocarbon formation during diverse phases of the European and U. S. cycles, as well as on a method of determining nitrogen oxides for nitric oxide formation and conversion studies. Statistical production control and control of all engine components affecting exhaust emissions are required. An international cycle, based on traffic studies and uniform sampling techniques, will be elaborated for the years after 1976 by the International Standardization Organization.

22285

APTIC NO. 41921

Thomas, William L.

AIR POLLUTION CONTROL SYSTEM FOR INTERNAL COMBUSTION ENGINES. (*Assignee not given.*) U. S. Pat. 3,645,093. 4p., Feb. 29, 1972. 8 refs. (Appl. Feb. 5, 1970. 10 claims).

A pollution control system for an internal combustion engine is described which includes an assembly having a combustion chamber and an igniter in the chamber to burn the exhaust gases from the engine. Air is pumped to the gases in the chamber and a cooling chamber surrounds the combustion chamber for cooling purposes. A baffle in the combustion

chamber imparts an upward swirling motion to the exhaust gases to direct them against a depending arch having a cavity for receiving the swirling gases, whereby a back pressure is created to facilitate combustion of the gases. Previous devices to control exhaust gases of motor vehicles were overly complex, too expensive to manufacture, or unsuccessful in meeting the many requirements of an effective and efficient pollution control device. (Author abstract modified)

22286

APTIC NO. 41775

iesler, H

THE REDUCTION OF ODOR EMISSIONS THROUGH AEROSOL FORMATION AND ELECTROSTATIC PRECIPITATION. (*Verminderung von Geruchsemissionen durch Aerosolbildung und elektrostatische Abscheidung*). Text in German. Schriftenreihe Ver. Wasser-Boden-Luft (Berlin), no. 35:71-77, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

The odorous emissions from the hardening of phenol-formaldehyde resins were treated by cooling them to a temperature below the dew point of the moist waste gases. The synthetic resin and oil aerosols form condensation nuclei. Coarser droplets were obtained which had a better sedimenting property and which could be better precipitated. The transit from the two-component system air and synthetic resin or phenol to the three-component system air-water-synthetic resin or phenol reduced the saturation concentration. Additional wetting of the waste gas enhanced the effect. The aerosol obtained this way was precipitated in an electrostatic precipitator. The collection electrodes were sprayed with water to avoid the sedimentation of oil on the wall. A tubular design was used for the electrodes because they produce a homogeneous electric field and their collection efficiency for finely dispersed dusts is better. The gas entered at the bottom and flowed through the 144 collection tubes to the top. Water was sprayed down from the top. The waste gas problem had been turned into a water pollution problem; through circulation of the water, the pollutants were concentrated in the water which made treatment easier.

22287

APTIC NO. 42295

Todo, Kaoyuki, Kunihiro Muramatsu, Minoru Kurita, Kiyoshi Ogawa, Toshio Sato, Makoto Ogawa, and Yoshihide Kotera. **THE EFFECT OF CHEMICAL COMPOSITION ON HYDROSULFURIZATION. ACTIVITY OF CO-MO-AL₂O₃ CATALYST.** *Bull. Japan Petrol. Inst.*, 14(1): 89-93, May 1972. 11 refs.

The precise optimum atomic ratio of cobalt to molybdenum, at which the activity of hydrosulfurization over Co-Mo-Al₂O₃ is maximum, was studied. The hydrosulfurization activities were measured over a series of catalysts, which are preferable with respect to the uniformity of impregnants and in which the concentration of impregnants were varied in a wide range of from about 3 to 16 wt% of molybdenum oxide and from 0 to 6 wt% of cobalt oxide. All catalysts were prepared by the coimpregnation technique. The measurement of initial desulfurization activity was conducted in a semi-batch method using a magnetically stirred autoclave. It was shown that the optimum ratio of Co to Mo depends to a significant extent on the concentration of impregnated MoO₃. This result was discussed on the basis of the fact that the dispersed state of MoO₃ on the carrier varied with the increases of the ratio and the concentration of MoO₃. (Author abstract modified)

22288

APTIC NO. 41710

Tomon, Eiichi

HIGH TEMPERATURE BAG FILTERS. (*Koon baggu firu-ta ni suite*). Text in Japanese. *Nenryo oyobi Nensho (Fuel and Combustion)*, 39(5):449-454, May 1972.

Bag filters were classified by the kind of filter cloth used. The temperature limit for different filter cloths continuously ex-

posed to gases as varied from 80 C for polypropylene fiber to 450 C for metal fiber. Four kinds of fiber have been used for high temperature bag filters: heat-resistant polyamide, Teflon, glass fiber, and metal fiber. However, due to the high costs of metal fiber and Teflon, only heat-resistant polyamide and glass fiber are commonly used. When woven cloth was used as a bag filter, collection efficiency was about 90% at pressure resistance of 30-50 mm Aq for a new filter; the collection efficiency increased to 99.5-99.9% when pressure loss was 120-150 mm Aq. A sticking layer of 0.3-0.6 mm usually formed at this moment. Further sticking caused higher pressure loss and was not practical. The optimum gas flow rate for synthetic fiber was 1.0-2.0 m/min and 0.3-0.9 m/min for glass fiber. The pressure loss of unwoven new filter was about 10 mm Aq. Higher gas flow rate could be used for unwoven filters since the primary sticking layer of particulate on the filters remained intact and no decreases in filtering ability occurred.

22289

APTIC NO. 42149

Tourtellotte, John F

CATALYTIC EXHAUST GAS TREATMENT APPARATUS. (*Chemical Construction Corp., New York*) U. S. Pat. 3,656,915. 8p., April 18, 1972. 10 refs. (Appl. April 30, 1970, 12 claims).

An apparatus is described for catalytically treating the exhaust gas from internal combustion engines in two stages, with the first catalyst stage reducing nitrogen oxides, and the second stage oxidizing hydrocarbons and carbon monoxide. Preheated air is injected into the exhaust gas stream between the stages, and the final hot fully reacted exhaust gas serves to preheat the air. The entire apparatus is disposed in a single container having flat inclined catalyst beds and a central co-axial heat exchange section. The principal advantage of the present apparatus is that a unitary combination is provided which is readily fabricated and easy to assemble. Another advantage is that the apparatus has a low overall pressure drop, and thus does not entail the provision of a high initial exhaust gas pressure or high back pressure. The apparatus also functions as a muffler since it has a dampening effect on sounds and pulsations of exhaust gas. (Author abstract modified)

22290

APTIC NO. 42183

Uchiyama, Hisashi and Naohiko Yoneno

STUDIES ON STACK GAS DESULFURIZATION (ABSORPTION OF SO₂) BY GRILL'S. (*Moredana ni yoru haen datsuryu (SO₂ no kyushu) no kenkyu*). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 331-333, 1972. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 37th, Nagoya, Japan, 1972.)

A gas stream containing 800-2000 ppm sulfur dioxide was used to study desulfurization by grills using sodium carbonate solution as the absorbent. The SO₂ was monitored by detecting tubes, titration, and the iodine method; the standard deviations were within 10%. For 90% absorption, the solution to gas mass ratio (L/G) should exceed 14 for the three stage grill and 16 for the two stage grill using water as the absorbent. For the same absorption rate using waste alkaline solution consisting of 39.9% magnesium hydroxide, 25.6% calcium hydroxide, and 24.4% calcium carbonate as the absorbent, L/G should exceed 10 for the three stage grill. With a 10% sodium carbonate solution, over 95% absorption was effected at L greater than 20,000 kg/sq m/hr. At L equals 10,000-30,000, pressure loss was less than 35 mm H₂O at empty gas velocity (Wg) of 3.5 m/sec; at L equals 120,000, pressure loss was less than 67 mm H₂O at Wg equals 1.0.

22291

APTIC NO. 41548

Ueda, Masaru

DEODORIZATION BY ADSORPTION METHOD. (*Kyuchaku ni yoru daisshu*). Text in Japanese. *Kagaku Kojo (Chem. Factory)*, 16(5):35-40, May 1972. 2 refs.

A general description of deodorization by adsorption is presented. A solvent adsorption recovery apparatus is usually used in case solvent is contained in the gas. The gas is cooled to below 40 C before being sent into the adsorbing tower, because the lower the temperature, the higher is the equilibrium adsorption rate. The solvent is adsorbed by activated carbon when the solvent-containing gas is introduced into the adsorption tower; solvent-free flue gas is discharged into the atmosphere. When the activated carbon of the first adsorbing tower is saturated with solvent, the gas is switched over to the second tower, and lower pressure steam is introduced to the first tower for washing. The mixture of solvent and steam is condensed and recovered. In case the solvent gas contains high boiling components, incomplete washing results in a break-through of the adsorption layer. A special showering set-up with part of the recovered solvent is used to extract the high boiling components. When the odorous component is high boiling and only with small concentration in ppm order, superheating steam is used for washing.

22292

APTIC NO. 41119

Upmalis, Alberts

EXPERIMENTS WITH A WET FILTER FOR HEAT RECOVERY FROM FLUE GASES. (*Versuche mit einem Nassfilter zur Waermerueckgewinnung aus Rauchgasen*). Text in German. Brennstoff-Waerme-Kraft, 24(5):208-211, May 1972, 2 refs.

A wet filter is described which recovers part of the heat from flue gases. Through convective heat transfer, water sprayed onto filters picks up the heat from flue gas. It passes this heat in a heat exchanger. The wet filter plant comprises filters sprayed with water. A filter chamber lies between the two filters. The flue gases enter through the openings in the lower section of the filter chamber, flow through the filter walls on both sides, are guided upward, flow through the filter walls to the upper section of the filter chamber, and leave through an opening for the stack. The filter mass is sprayed with water from the top. The water is heated up by the flue gases, flows to a tank in the bottom from where it goes to a basin with a heat exchanger where water is heated for usage. The spraying water is recirculated. The wet filter for heating water also retains the soot and fly ash carried by the flue gas. Theoretically, it should also retain the sulfur compounds. No experience has been gained yet in this respect, since no oil was burned.

22293

APTIC NO. 41923

Urban, Peter

PROCESS FOR SCRUBBING SULFUR DIOXIDE FROM A GAS STREAM. (*Universal Oil Products Co., Des Plaines, Ill.*) U. S. Pat. 3,644,087. Sp., Feb. 22, 1972, 7 refs. (Appl. Feb. 9, 1970, 13 claims).

When a gas stream containing both sulfur dioxide and oxygen is scrubbed by an aqueous solution of an alkaline reagent, the formation of sulfate compounds as one of the by-products of the scrubbing step is inevitably observed. These sulfate by-products are very intractable and present a significant barrier to the use of conventional scrubbing procedures, particularly where the scrubbing step is coupled with a regeneration step in a closed system wherein the scrubbing solution is continuously being recirculated. In a closed system, the sulfate by-products tend to build up in the recycle water stream until finely divided solids are formed, which can foul the equipment or cause severe corrosion and erosion problems. However, the water soluble sulfate compound that is formed by the reaction of the alkaline reagent with sulfur dioxide in the scrubbing step can be easily and quickly converted by a suitable reducing agent to the corresponding thiosulfate compound which has a very small propensity to oxidize to the corresponding sulfate compound.

22294

APTIC NO. 42051

Urban, Peter

TREATMENT OF THIOSULFATE-CONTAINING AQUEOUS SOLUTIONS WITH CARBON MONOXIDE. (*Universal Oil Products Co., Des Plaines, Ill.*) U. S. Pat. 3,649,183. Sp., March 14, 1972, 5 refs. (Appl. Dec. 17, 1969, 15 claims).

A method is presented for the conversion of a water soluble thiosulfate compound to a lower oxidation step - primarily to the corresponding sulfide compound and hydrogen sulfide. This is accomplished by contacting an aqueous solution of the thiosulfate compound with carbon monoxide at a temperature of about 125-350 C and a pressure sufficient to maintain at least a part of the water contained in the solution in the liquid phase. This treatment is used during the regeneration of aqueous streams produced during the scrubbing of sulfur dioxide from flue gas. (Author abstract modified)

22295

APTIC NO. 41569

Ussar, Max B.

PROTECTION OF THE ENVIRONMENT: PROBLEMS AND TENTATIVE SOLUTIONS. (*Umweltschutz-Probleme und Loesungsversuche*). Text in German. Glueckauf (Essen), 1971-1972: 4-6.

General problems of environmental protection in Austria are outlined with special regard to air and water pollution. Traffic and industry account for 40% and 35% of the total emissions, respectively. The separation techniques developed for solid as well as toxic and irritant pollutants such as sulfur dioxide, chlorine, fluorine and their compounds, as well as nitrogen oxides require further improvements technically and economically. The complex nature of ecologic problems calls for the cooperation of experts and institutions in many areas. Environmental aspects of industrial processes should be made part of the curriculum of institutions of higher education. Industry should be allowed time to adopt air pollution standards.

22296

APTIC NO. 41283

Varshavskiy, I. L. and R. V. Malov

HOW TO NEUTRALIZE AUTOMOBILE EXHAUST GASES. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. The Toxic Components of Automobile Exhaust Gases: Their Composition Under Different Operating Conditions, and Methods of Reducing Their Emission*. M. Y. Nuttonson (ed.), Vol. 10, Silver Spring, American Institute of Crop Ecology, 1971, p. 1-105, 23 refs. (Also: Moscow, Transport Publishing House, 1968, p. 3-126).

NTIS: PB 204362

The effects of exhaust gases from gasoline and diesel engines on the human organism are briefly reviewed together with chemical methods of analysis for exhaust components and the theoretical evaluation of the specific toxicity of exhaust gases. Reduction of toxic exhaust components by modification of engine operating conditions, use of vacuum regulators or fuel additives, mixture leaning out, ignition with a high-energy spark, and flame ignition is considered. Devices for neutralizing engine exhausts are evaluated including liquid neutralizers, flame afterburners, catalytic neutralizers, and thermocatalytic neutralizers, and three forced crankcase ventilation systems for control of crankcase gases are described. The operating principles of improved power sources now under development are also discussed, including piston-type internal combustion engines, rotor (volumetric) internal combustion engines, gas-turbine engines, jet engines, Stirling engines, and nonmechanical energy converts, i.e., magnetohydrodynamic, thermoelectric, and thermionic generators; and storage batteries and fuel cells.

22297

APTIC NO. 42291

Ventriglio, Frank J., David M. Zall, Cyril J. Stockhausen, and Donald R. Decker, Jr.

METHOD OF REMOVING CARBON DIOXIDE FROM GASEOUS MIXTURES. (Dept. of the Navy, Annapolis, Md.) U. S. Pat. 3,619,130. 6p., Nov. 9, 1971. 5 refs. (Appl. Aug. 27, 1968. 6 claims.)

A method is presented for removing unwanted gas from confined breathing atmospheres with a dry carbon dioxide-sorbent system which will eliminate a number of problems associated with previous techniques. Carbon dioxide is removed by passing air through a sorbent material made by treating molecular sieve-type zeolite with an aqueous solution of any alkali carbonate. The sorbent material may be regenerated repeatedly by passing heated air or superheated steam through the material. Problems with previous sorbents involved elaborate predrying systems for sodium aluminum silicate compounds, the precooling required for activated carbon and its low absorption capacity at low pressures, and the fact that alkali hydroxides are subject to moisture attack. (Author abstract modified) 0

22298

APTIC NO. 40971

Vizza, Joseph

POLLUTION CONTROL FOR SMOKESTACKS. (Assignment not given.) U. S. Pat. 3,641,742. 6p., Feb. 15, 1972. 4 refs. (Appl. Feb. 5, 1970. 4 claims.)

An open-bottomed domelike member is supported over and in spaced relation to the open end of a stack or flue to divert products of combustion outward and downward into a casing, the downward moving products of combustion being sprayed with water before escaping outward and upward from a casing surrounding the domelike structure. Air jets tend to force feed the products of combustion upward through the stack to maintain proper circulation and to supply additional oxygen to assist in completing combustion of the flue gases. (Author abstract modified)

22299

APTIC NO. 40968

Voelz, Frederick L.

CARBURETOR ADJUSTING METHOD. (Atlantic Richfield Co., New York) U. S. Pat. 3,640,255. 5p., Feb. 8, 1972. 2 refs. (Appl. Nov. 4, 1970. 10 claims.)

A method is described for optimizing the performance of an internal combustion engine carburetor to minimize the amounts of carbon monoxide and hydrocarbons in the engine exhaust gases while still providing for an efficiently operating engine. The method involves adjusting the air-fuel mixture to the carburetor to minimize the amount of hydrocarbons in the engine exhaust gas. While many methods for adjusting carburetors have sought to control the air-fuel ratio at the value specified by the engine manufacturer, none of these methods seek to adjust the carburetor to give a smooth, efficient running engine which emits a minimum amount of air pollutants. (Author abstract modified)

22300

APTIC NO. 41935

Vukasovic, Lovro and Rudolf Hofmann

CIRCUIT ARRANGEMENT FOR AUTOMATIC CONTROL OF THE VOLTAGE OF AN ELECTRICAL FILTER. (Siemens A. G. Munich (West Germany)) U. S. Pat. 3,643,405. 9p., Feb. 22, 1972. 8 refs. (Appl. March 6, 1970. 11 claims.)

A circuit arrangement for automatic control of the voltage of an electrical filter is described which comprises a charging circuit which connects a guide capacitor to a source of DC voltage. A discharging circuit is connected in parallel with the guide capacitor and includes a controllable resistor having a resistance value dependent upon the voltage of the filter. A photo-element is in operative proximity with a glow lamp in a

manner whereby light produced by the glow lamp impinges on the photoelement. The photoelement is coupled by a circuit to the discharging circuit for supplying a control signal dependent upon the irradiation of the photoelement. Thus, the control signal holds the resistor of the discharging circuit to a low resistance value when the glow lamp does not glow and holds the resistor to a high resistance value when the glow lamp glows. A cutoff circuit supplies a cutoff signal to the control system and the control system controls a control circuit to interrupt the filter current without delay when a sparkover occurs in the filter. (Author abstract modified)

22301

APTIC NO. 42073

Wagner, A. J.

CUPOLA EMISSION CONTROL AT AUTO SPECIALTIES MANUFACTURING CO. Mod. Casting, 62(1):38-40, July 1972.

A new cupola emission control system was combined with innovative changes in cupola operation to achieve emission control results that exceed current regulation requirements. In the cupola control room, a closed circuit TV screen shows the charge chart as it is generated, and an electronic printout produces a simultaneous duplicate of the spectrographic analyses being carried out in a plant laboratory of cupola iron composition prior to its firing in the electric furnace. Several cupola engineering innovations were also made that substantially changed the melting operation, including incorporation of a high efficiency heat exchanger; installation of a vibratory feeder method of introducing charges; repositioning of water-cooled tuyeres and incorporation of titanium cooling tubes on the tuyeres; increased blast capacity plus installation of a standby blower; a new water cascade pattern for shell cooling; installation of afterburners; and increasing height of stacks by 15 ft. Gas temperature into the baghouse is monitored automatically and provides for a 525 F (173.9 C) cutoff. Operating experience has been good.

22302

APTIC NO. 42171

Weber, Ekkehard

ANNUAL SURVEY ON THE MAINTENANCE OF CLEAN AIR (EIGHTH SEQUENCE). (Jahresuebersicht Reinhaltung der Luft (8. Folge)). Text in German. Gieserei (Duesseldorf). 59(11):373-381, June 1972. 80 refs.

The problems of air pollution were handled by the individual states of the Federal Republic of Germany until 1960 when the federal government intervened. The regulations for obtaining an operating license for industrial and commercial enterprises were updated to include a list of various industrial plants which require a special license for reasons of environmental protection. This list was further expanded in the year 1971. The state of North Rhine Westphalia undertook great efforts for the determination of emission sources. The discussion of air pollution problems and control measures widened. A literature review of articles on these subjects, which appeared in German and English language journals in 1971, is given. It is noted that nothing was published in 1971 on the use of dry mechanical dust collectors for specific use in foundries. A new high-capacity dry collector is described for general use, consisting of mechanical air filters in prefabricated units which can be assembled according to need. No paper concerning the use of electrostatic precipitators behind cupola furnaces appeared in 1971. Because of the rising demands concerning air quality, many publications came out in the field of pollutant measurements.

22303

APTIC NO. 42131

Wetch, Joseph R. Seymour Sudar, and Louis L. Bienvenue

MUFFLER DEVICE FOR REMOVING IMPURITIES. (North American Rockwell Corp., Canoga Park, Calif.) U. S. Pat. 3,647,394. 8p., March 7, 1972. 4 refs. (Appl. Feb. 20, 1970. 14 claims.)

A muffler is described which comprises a liquid scrubbing medium that will remove lead from the exhaust gas. In previous muffler systems which used catalysts, one of the most prevalent problems was lead poisoning on the surface of the catalyst. The present device can also be used to pre-clean exhausts before they are recirculated to the engine inlet manifold for nitrogen oxides control, thus alleviating many of the operating problems of that system. The muffler device incorporates a packing material which is preferably comprised of a finely divided surface which can serve for filtering impurities and/or a means for providing chemical reactive sites. The packing can also serve as a demister to remove entrained liquid from the gas stream. A reservoir of a material which is molten or liquid at least at the operating temperatures of the engine is part of the device, and a venturi is provided for conducting the liquid from the reservoir into the exhaust gas stream prior to contacting the exhaust gas with the packing.

22304

APTIC NO. 41533

Winkelman, F. W.

SYSTEMS AVAILABLE FOR REMOVING OIL SOOT FROM PRECIPITATOR HOPPERS. *Power*, 116(6):57-59, June 1972.

Many new generating stations are designed for low-sulfur oil-firing to meet antipollution regulations. This switch to low-sulfur oil has created some operational problems, such as the removal of oil soot from precipitator hoppers. A frequently accepted method for removing the oil soot is the pressure system with air locks. It is similar to those which remove coal fly ash, except that the pressurized conveying air must be heated. The advantages and disadvantages of this system are given. The air-educator pressure system is one of the most effective oil soot removal schemes. It has the pressure system advantage of upstream blowers, is suitable for soot reinjection, has low initial cost and no moving parts. A third type of pressure system uses rotary star feeders. However, it is not a highly recommended system. Vacuum systems for removing oil soot use conventional material handling valves to empty each hopper individually. Possibly the simplest and least expensive solution to the problem is to replace the hydraulic evacuator with a centrifugal blower. Its suction creates a vacuum for continuous soot removal; entrained material passes through the fan and is conveyed pneumatically by pressure to the boiler. The system can operate continuously with almost no controls. Regardless of the removal scheme selected, the entrained material must be conveyed to the boiler or storage silo through heated, abrasion-resistant pipe that has wear sections at elbows and bends.

22305

APTIC NO. 41781

Winkler, K.

THE ODOR PROBLEMS OF THE CHEMICAL INDUSTRY. (*Geruchsprobleme der chemischen Industrie*). Text in German. Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no. 35:97-99, 1971. (Presented at the Colloquium *Geruchsbelastende Stoffe*, Duesseldorf, West Germany, March 18, 1971.)

A chemical plant in Leverkusen employs three full-time employees for locating odor sources. If an outlet for waste air from a dozen stations is pinpointed as the source of the odor emissions, a mercaptan-specific continuously recording measuring unit is used for determining the emission. Identification of the odorous substances usually is quite difficult and time consuming. In one case, a gas chromatograph with various detectors was used. A branch of the gas flow coming from the column was detected by inhalation. A diketone was finally identified as the odorous substance. Its concentration in the waste air was 4 mg/cu m. Once the odorous waste air is collected in a pipe line, its elimination is not difficult, provided the air quantity is not too large. A regularly emitted odorous substance poses no elimination difficulties. The real odor problems of the chemical industry occur during operating troubles, cleaning of equipment and pipes, or pipe-leaks due to

corrosion. One leak through which hydrogen sulfide escaped triggered a several-day search. As far as the elimination of odors is concerned, good results were achieved with activated coal. The most frequently used method is the oxidizing scrubbing process. The safest method for odor elimination is thermal afterburning at a temperature of 1000 C; however, it is too expensive to be used for large air volumes. Less satisfactory results were achieved with catalytic afterburning. Ozone as the oxidizing agent did not bring encouraging results.

22306

APTIC NO. 41147

Wedkowski, C. S. and E. E. Weaver

THE EFFECTS OF ENGINE PARAMETERS, FUEL COMPOSITION AND CONTROL DEVICES ON ALDEHYDE EXHAUST EMISSIONS. Preprint, *Air Pollution Control Assoc.*, Pittsburgh, Pa., 31p., 1970. 14 refs. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Calif., Oct. 8, 1970.)

A gas chromatographic method for the determination of the 2,4 dinitrophenylhydrazones of carbonyl compounds was used to determine the effects of engine operating parameters, fuel composition, and experimental control systems on aldehyde mass emissions and composition. A chassis dynamometer employing the proposed Federal 1972 mass emission procedure of total exhaust dilution with a constant volume sampler and the nine-cycle, eight mode driving schedule was used. Changing the air/fuel ratio on a 1969 production vehicle from slightly leaner than production to one slightly richer reduced the mass aldehyde emissions from 0.39 to 0.24 g/mile at 12 BTDC and from 0.36 to 0.21 g/mile at 0 TDC, a decrease of 40%. Spark timing had an even more significant effect on aldehyde emissions retarding the spark 24 from 12 BTDC to 12 ATDC decreased aldehyde mass emissions, at all carburetor settings tested. At 12 ATDC all aldehyde mass emissions tended toward a common minimum value of 0.15 g/mile. Aldehyde composition was determined with the vehicle operating on four different fuels, isooctane; 75% toluene 25% isooctane; a 5-component hydrocarbon blend; and a full boiling range unleaded commercial type fuel. The aldehyde composition of the exhaust reflected the fuel composition in these experiments. Three vehicles equipped with experimental hydrocarbon control systems were run on chassis dynamometer and compared with a production 1969 vehicle. A high volume thermal reactor vehicle decreased hydrocarbon and aldehyde emissions by 80%; an experimental engine with a catalyst decreased hydrocarbons and aldehydes by 80% and 95%; and a production vehicle with a catalyst removed 83% of the hydrocarbons and 100% of the detectable aldehydes. (Author summary modified)

22307

APTIC NO. 42274

Wolf, Friedrich, Wolfgang Krueger, and Helmut Fuerdig

STUDIES OF THE THERMAL STABILITY OF VANADIUM CATALYSTS IN THE OXIDATION OF SULFUR DIOXIDE. (*Untersuchungen zur thermischen Stabilität von Vanadinkatalysatoren bei der Oxydation von Schwefeldioxyd*). Text in German. Chem. Tech. (Berlin), 24(6):359-362, June 1972. 14 refs.

Vanadium catalysts for the oxidation of sulfur dioxide contain the active components potassium-sulfovanadate and the carrier kieselguhr or synthetic silicic acids. The influence of potassium-sulfovanadate melts and the influence of various gas atmospheres (sulfur trioxide, sulfur dioxide, oxygen, and nitrogen) on the conversion of the silicic acid modification of the carrier were studied. The changes of the catalytic activity and of the pore structure of a vanadium catalyst on the Kieselguhr (Coswig) basis were observed. The catalytic activity was determined under isothermal conditions with a reaction gas composed of 6 vol.% SO₂, 11 vol.% O₂, and 83 vol.% N₂. The pore structure was examined with a high-pressure (to 1000 atm) porosimeter. Kieselguhr Coswig consists of amorphous sil-

ic acid. Temperatures of 650 C and 900 C caused the formation of a crystalline transitional state. Through the presence of potassium, sulfovanadate beta-cristobalite is formed. Tempering of the vanadium catalyst at 650 C plus or minus 5 deg in the gas atmospheres SO₃, SO₂, O₂, and N₂ leads to an irreversible drop of the catalytic activity, to SO₂ oxidation, and to a widening of the pore structure from 3800 to 3900 Å to 9500 Å. A stepwise re-crystallization of the amorphous silicic acid to beta-cristobalite was observable in the carrier. A possible explanation for these changes could be seen in a probable change of the boundary-layer tension between melt and carrier.

22308

APTIC NO. 41547

Yamaguchi, Takaaki

ODOR THRESHOLD AND APPLICATION OF CONTROL TECHNIQUE. (*Shuki genkai nodo to boshi gijutsu no oyo*). Text in Japanese. *Kagaku Kojo (Chem. Factory)*, 16(5):27-31, May 1972. 2 refs.

The detection of odorous compounds in a plant was divided into three stages. The first stage was searching for odor sources by an investigation team. The second stage was the determination of the odorous compounds and the concentration by a simple detecting tube method. The third stage consisted of detecting minor odorous compounds in ppb order which could not be detected by the detecting tube method. Gas chromatography with flame photometric detector was used for this purpose. Various methods were used for the control of odors. Solid absorbents, such as carbon or zinc compounds, were suitable for small amounts of odor, and liquid absorbents were used for large amounts of odor. Comparisons of different solid absorbents and different deodorization methods are given. ½

22309

APTIC NO. 42114

Yamamoto, Kyoko, Michiharu Seki, and Kunitaro Kawazoe

RATE OF OXIDATION OF SULFUR DIOXIDE ON ACTIVATED CARBON SURFACES. (*Kasseitan kyomen ni okeru nisanka io no sanko hanna sokudo*). Text in Japanese. *Nippon Kagaku Kaishi (J. Chem. Soc. Japan)*, no.6: 1046-1051, June 1972. 8 refs.

When a mixed gas of sulfur dioxide, oxygen, and water is brought into contact with activated carbon, SO₂ is oxidized to sulfuric acid and accumulates in the carbon. The amount of H₂SO₄ increased with time almost linearly until it reached 10 weight percent of the carbon in SO₂ base. In the region where the rate of the oxidation reaction was constant, the effects of concentration of each gas and of temperature on the reaction rate were investigated. The reaction rate showed a linear relation with the SO₂ concentration in gas phase when the concentration was less than 0.01%, but, after a gradual change, with increasing SO₂ concentration, it became proportional to the square root of the SO₂ concentration until it was over 1.0%. The reaction rate was also proportional to the square root of concentration of O₂ and H₂O. The apparent activation energy of this reaction was found to be from -4 to -7 kcal/mol. (Author abstract modified)

22310

APTIC NO. 41581

Yamamoto, Masaichi

UTILIZATION OF HYDROGEN IN THE PETROLEUM REFINERY INDUSTRY. (*Sekiyu seisei kogyo ni okeru suiso no riyō*). Text in Japanese. *Sekiyu gakkai shi (J. Japan Petroleum Inst., Tokyo)*, 15(1):2-15, Jan. 1972. 44 refs.

The consumption of hydrogen in the petroleum industry in 1970 was 141,500,000 cu m/day, next to that in ammonia production. The hydrogen consumed in the petroleum industry was used in hydrodesulfurization of naphtha, kerosene, light oil, and residual oil. The reaction conditions for the desulfurization of reduced pressure distillate are usually 400 to 450 C; pressure, 70 to 120 kg/sq cm; space velocity, two to four;

and hydrogen consumption, 400 to 600 cu ft/bbl. The sulfur content of the desulfurized oil can be minimized to 0.2 to 0.5 wt %. The reaction conditions for the desulfurization of crude oil depend on the property of the oil. However, general conditions include temperature, 400 to 450 C; pressure, 70 to 200 kg/sq cm; space velocity, 0.5 to 1.0; and hydrogen consumption, 110 to 220 cu m/kl. In the USA, the sulfur dioxide in air 1970 was predicted to be half from coal and the other half from oil. The highest concentration was 0.1 ppm. The concentration in Tokyo in 1969 was 0.69 ppm. The catalysts used for the hydrodesulfurization of oils are usually metals such as nickel, cobalt, and molybdenum with alumina or silica-alumina as support.

22311

APTIC NO. 42294

Yamamoto, Tamchika

WASTE DISPOSAL METHODS AND PROBLEMS. *Chem. Economy Eng. Rev.*, 4(5):32-37, May 1972.

Pollution caused by the combustion of sulfur-containing fuel oil and by automobile exhaust fumes, problem points of countermeasures to pollution, and the direction of solutions are discussed. Methods to control pollution include: selective hydrogenation of fuel oil and other petroleum products, catalytic oxidation of exhaust gas, and gasification of asphalt. Designated countermeasures to automobile exhaust pollution are: innovations in automobile engines and oil refining techniques, purification of automobile exhaust, and the use of lead-free gasoline. Methods to dispose of sulfur, radioactive wastes, plastic wastes, and city sewage are presented. The manufacture of isoparaffin hydrocarbons is also considered.

22312

APTIC NO. 41054

Yamasaki, Shuichi, Masao Kitayama, and Toshihiko Matsubara

ENGINE EXHAUST GAS RECOMBUSTION DEVICE.

(*Enjin no haiki gasu no sainenshoshitsu sochi*). Text in Japanese. (Honda Technological Research Lab., Wako (Japan)) *Japan. Pat. Sho 46-36324*. 2p., Dec. 14, 1971. (Appl. March 29, 1969. 1 claim).

An exhaust pipe which leads the exhaust gas from the engine to a recombustion chamber is described. The pipe is composed of double pipes with an insulation layer between. The gas from the engine exhaust will reach the recombustion room without lowering its temperature.

22313

APTIC NO. 41044

Yazawa, Masaru

ABATEMENT OF DUST FROM SAND TREATMENT AND FORMATION REPOSITORY (EXCERPT). (*Suna shori kataba yori hassei suru funjin taisaku (bassui)*). Text in Japanese. *Chutanzo (Casting and Forging)*, vol. 25:72-73, March 1972.

Measurements of particulate concentrations in some metal casting machine factories reveal that they are as high as 4-8 g/cu m on a shake-out grate, 3-8 g/cu m in the short-blast cabinet, 2.4-3.6 g/cu m at the entrance of a wet-type dust collector, 1.4-1.8 g/cu m on a cupola furnace, and up to 0.22 g/cu m at various working places. Particulate control policy considered 0.1 g/cu m as the maximum discharged concentration. Six important points for the control were mentioned, among them, the selection of a suitable dust collector is the most important. Eleven types of dust collectors were tabulated with the specific characteristics. Most of the dust collectors have a collection efficiency higher than 95%. For the sand treatment, a wet, orifice type collector was sufficient.

22314

APTIC NO. 41601

Yermolenko, I. N. and I. P. Ivubliner

AMMONIA SORPTION ON ION EXCHANGE FIBERS UNDER DYNAMIC CONDITIONS. (*Sorbtsiya ammiyaka voloknistymi ionobmennikami v dinamicheskikh*

usloviyakh). Text in Russian. Zh. Prikl. Khim., 45(4):748-751, 1972. 7 refs.

As opposed to synthetic ion exchange resins, ionite fibers exhibit better surface properties associated with very small elementary fiber diameters. Laboratory tests performed on the cellulose phosphate ion exchange fiber sorption characteristics with ammonia indicate that the dynamic activity of the fiber depends on the humidity and thickness of the layer and reaches a maximum of 70-75% at 20% humidity content and 70mm thickness. Part of the sorbent's capacity can be regenerated soon by mere interruption of gas feeding. Acid cellulose phosphate fibers and tissues appear to be appropriate filter fabrics to be used for basic gas-contaminated air cleaning procedures.

22315

APTIC NO. 42071

York, Wayne Jason

REDUCTION OF SUB-BITUMINOUS COAL AND LIGNITE USING CARBON MONOXIDE. Montana State Univ., Bozeman, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1971, 153p. 58 refs.

The reduction of a sub-bituminous coal and three lignites using carbon monoxide rather than molecular hydrogen was investigated. Equipment consisted of a 500 ml rocking autoclave which operated within 380-450 C at a maximum operating pressure of 5000 psi. The analyses included the conversion of the coal to benzene soluble material, gas analyses of the reaction gases, and ultimate analyses and molecular weight determinations of the liquefied coal. Increasing pressure and temperature increase conversion, but hydrocarbon gas production increased with temperature as well. The best solvents were a mixture of alpha-naphthol and phenanthrene for lignite and anthracene oil for sub-bituminous coal. Grinding the coal in a mortar and pestle produced better conversion results than pulverized coal because the coal was less oxidized in the grinding method. Sodium carbonate was studied as a catalyst for the liquefaction of coal using CO with quite successful results. The tar product obtained from the coal had a hydrogen-to-carbon ratio of about 1:1 and an ash content of less than 0.1% compared to the coal hydrogen-to-carbon ratio of 0.8 and 7% ash. This product would be an ideal fuel for magnetohydrodynamics. Two processes utilizing the liquefaction of coal using CO were designed and studied economically. (Author abstract modified)

22316

APTIC NO. 41785

Yoshimura, Isao

APPLIANCES HANDLING PARTICLES AND POWDERS. (Funryutai no handlingu yo kiki ni tsuite) Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(1):30-36, April 1972.

Rotary Air Locks are used to remove dust particles; their structure varies depending on their purpose. Problems are discussed and types of Air Locks are described. The Air Locks are used in many industries to remove particulates.

22317

APTIC NO. 41136

Zankar, A.

NOMOGRAM FOR COLLECTION EFFICIENCY CALCULATION IN ELECTRICAL DUST PRECIPITATORS. Brit. Chem. Eng. Proc. Tech., 17(4):343, April 1972. 1 ref.

The collection efficiency of dust in electrical dust precipitators is in a way proportional to the dust particle migration velocity toward collecting electrodes, the gas velocity inside the collector, and its geometrical dimensions. A nomograph is presented which solves the three equations expressing the collection efficiency for rod-and-curtain type precipitators, wire-and-plate type precipitators, and parallel plate precipitators.

22318

APTIC NO. 41778

Zenkner, K.

DESIGN OF THERMAL AFTERBURNERS AND EVALUATION OF MEASUREMENT RESULTS.

(Auslegung von thermischen Nachverbrennungsanlagen und Auswertung von Messergebnissen). Text in German. Schriftenreihe Ver. Wasser-Boden-Luftthyg. (Berlin), no. 35:85-91, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

A thermal afterburner is described comprising a heat exchanger, a burner system, and the combustion chamber. The waste air which is to be treated is preheated in the heat exchanger with the energy of the waste gases leaving the combustion chamber. It is most economical to preheat the waste air to a temperature of 650 C and burn it at 800 C. A combustion chamber temperature of 800 C converts 99.8% of all pollutants. The investment costs for a complete thermal afterburning system of the type described amount to approximately \$3.75/cu m for large plants and \$4.50/cu m for smaller plants.

22319

APTIC NO. 40986

Zhidkov, B. A. and G. A. Skvortsov

SELECTION OF AN EQUILIBRIUM CONSTANT OF THE REACTION OF NITROGEN DIOXIDE WITH WATER. (Vybor konstanty ravnovesiya reaktsii vzaimodeystviya dvoxkisi azota s vodoy). Text in Russian. Khim. Prom. (Moscow), 47(11):836-837, 1971. 7 refs.

The equilibrium constant for the reaction of nitrogen dioxide with water was determined at temperatures under 75 C for application to NOx concentrations in exhaust gases. The nitric acid concentrations used in the determinations for absorbing the NO2 ranged from 0.1 to 70%. The calculated equilibrium constants agreed with experimentally determined values.

22320

APTIC NO. 41441

Zhulin, N. V. and A. A. Komlev

USE OF DETERGENTS FOR THE FLOCCULATION OF PARTICLES IN GAS SCRUBBING SOLUTIONS FROM ALUMINUM PRODUCTION. (Primeneniye moyushchikh sredstv dlya flokulyatsii chastits v rastvorakh gazoochistki alyuminiyevogo proizvodstva). Text in Russian. Tsvetn. Metal., 45(1):53-54, 1972. 4 refs.

After standing for 2-3 days, the title gas scrubbing solutions still contained 0.5-1.0 g suspensoid/l. This contaminated the regenerated cryolite. The addition of STU-27-880-65 soap chips sharply increased the flocculation rate of the suspensoids. The optimum amount added depended on the amount and properties of the suspensoids. The addition of excessive amounts of flocculant and of sodium hydroxide decreased, and of flocculation sludge increased, the flocculation rate. The flocculation mechanism is discussed.

22321

APTIC NO. 42275

Ziminski, Richard W.

SELECTING AND OPERATING YOUR ELECTROSTATIC PRECIPITATOR FOR OPTIMUM PERFORMANCE. Power, 115(10):86-87, Oct. 1971.

Electrostatic precipitators are one of the leading means of achieving high efficiency collection of dusts, fumes, and mists. Their low resistance to gas flow, low power requirements, and ability to collect both large and small particles are substantial reasons for their broad application. The primary advantages of electrostatic precipitators are listed. One limitation of an electrostatic precipitator is that it handles only the removal of solid particulates; it cannot clean gaseous emissions such as sulfur dioxide or hydrogen chloride. Another limitation is that it is restricted to applications where there are no explosive gases in the gas stream, because of the sparking nature of the unit. Another disadvantage is their high initial capital costs.

The efficiency of a precipitator in any given application depends on two factors: the size of the unit, that is, the total area of collecting plates, and the degree of electrical sectionalization. When specifying or comparing precipitators in a specific application these details must be considered: volume of gases to be treated, temperature of gases and fluctuations in temperature, efficiency desired, particle sizes and percent of total weight in each size, and particle chemistry. Careful maintenance is essential.

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APTIC NO. 41070

OXONE ANALYZER. (*Ozon-Analysatoren*). Text in German. *Wasser Luft Betrieb*, 16(4):130, April 1972.

New ozone analyzers in commercial production automatically and continuously measure the ozone concentration of the air. The measurement principle is based on a photometric scanning of the chemiluminescence which develops in the reaction of ozone with gaseous ethylene. The signal can be passed to a recorder or a computer. The sensitivity is better than 1 ppb ozone. No other air pollutants interfere with the measurement. The accuracy is plus or minus 2%.

22323

APTIC NO. 41071

GAS CHROMATOGRAPHY IN THE MONITORING OF AIR POLLUTION. (*Gaschromatographie bei der Überwachung der Luftverschmutzung*). Text in German. *Wasser Luft Betrieb*, 16(4):131, April 1972.

The new air quality chromatograph model 6800 measures carbon monoxide, methane, and total hydrocarbon concentration. Ethylene and acetylene can also be measured. Four, six, or 12 fully automatic analyses per hour can be taken. Through the flame ionization detector a sensitivity of 1 ppm for each component measured can be achieved. Any interference by other components is avoided.

22324

APTIC NO. 41178

Etablissements Gourdon Versailles (France)

THE ATMOSPHERIC POLLUTION CONTROL APPARATUS AFG. (*Appareil de controle de pollution atmospherique AFG*) 1968 (?). Translated from French. 5p.

A device is described that continuously measures the amount of sulfur dioxide in the air. The air to be analyzed is pumped at a constant flow rate across a filter paper, water bottle, and flow indicator. The washing device is furnished with a 2% solution of oxygenated water with pH 4.5 to avoid the interference of weak acids. Sulfur dioxide passes into solution and is retained as sulfuric acid. Gradually, and in proportion to the retention of acid in the washing device, a metering pump injects quantities of sodium borate into the solution in order to maintain the 4.5 pH. The motor of the metering pump is controlled by a pH-metering regulating system. The rates of SO₂ pollution are given, to an approximate factor, by the sodium borate consumption, or by the displacement of the moveable component of the metering pump. Display of the information is given in numerical form, locally or at a distance by means of telephone lines.

22325

APTIC NO. 41182

TRW Systems Group, McLean, Va., Washington Operations
PROPOSED AIR QUALITY SURVEILLANCE SYSTEM FOR THE STATE OF ALABAMA. *Office of Air Programs Contract 68-02-0048, APTD 0874*, 98p., Nov. 1971. NTIS: PB 205179

For each of the seven Air Quality Control Regions in Alabama, a survey is described of the existing air quality monitoring and data systems. In addition, each area is as-

signed one of three priority classifications for each of the following pollutants: particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, and oxidants. Justifications for the classifications assigned to the area are provided, and the minimum requirements for air quality monitoring based on the particular classifications of each area are described. Furthermore, an expanded air quality surveillance system is suggested for each area which would provide for the long term goals of the Alabama air quality monitoring system. A tabulation of required and existing air quality surveillance equipment is provided along with a timetable for acquisition of needed equipment. Also described are standardized methods of sample collections and analysis and data handling.

22326

APTIC NO. 41219

Hungarian People's Republic, Ketucki Group

INVESTIGATION OF THE RELATIONSHIP BETWEEN OPERATING CONDITIONS AND THE QUANTITY OF EXHAUST GASES FOR PURPOSES OF EVALUATING THEIR TOXICITY. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhopnymi Gazami Avtomob.*, Proc. Symp., 2nd, 1971. Translated from Russian. 10p.

Computational methods were developed for determining automotive exhaust emissions, particularly in areas like tunnels where air exchange is restricted, under certain basic operating conditions. The relationships developed for these operating conditions can also be used to determine exhaust gas emissions under city traffic conditions. Standard types of passenger cars, truck, and buses applicable to conditions in Hungary were selected on the basis of the distribution of the relative frequency of cylinder displacement and specific output. Equations are given for the determination of exhaust gas emission at idling speed in carburetor engines and diesel engines and under conditions of acceleration, constant running speed, and deceleration.

22327

APTIC NO. 41270

Hungarian People's Republic, Ketucki Group

A TEST STAND FOR EVALUATING THE EMISSION OF TOXIC SUBSTANCES WITH THE EXHAUST GASES OF GASOLINE ENGINES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhopnymi Gazami Avtomob.*, Proc. Symp., 2nd, 1971. Translated from Russian. 13p.

Driving cycles simulating average real conditions of city vehicular movements were developed for the investigation of harmful automotive exhaust emissions. The test stand comprises running rollers, devices simulating the inertial mass of the vehicle, a braking device for simulating the force of resistance to movement, and signal systems. The characteristics of the hydraulic brake are determined by five factors: the moment coefficient, the strength characteristics, the maximum quantity of heat that can be carried off, the maximum permissible revolutions, and the brake idling speed. Factors affecting the brake moment in addition to diameter and revolutions are blade shape, quality of blade surface, quality of the blades and their thickness, the angles at which the blades are installed, the dimensions of the slots between rotor and stator blades, and the density of the fluid used. Design criteria for the test stand are given.

22328

APTIC NO. 41590

Asbestosis Research Council, Lancashire (England)

THE MEASUREMENT OF AIRBORNE ASBESTOS DUST BY THE MEMBRANE FILTER METHOD. *TN-1*, 10p., Sept. 1971

The method used to determine the dust concentration as required by the Asbestos Regulations of 1969 for the United

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Kingdom is described. A pumping system, filter holder, 0.8 micron membrane filters, and a flow meter are recommended. Alternate methods of sampling are continuous sampling, snap sampling, and personal sampling. Samples may be fixed with chloroform, or by a cytological fixer in aerosol form. Filtered glycerol triacetate is used in mounting on a microscope slide. Statistical counting procedures are used in mounting on a microscope slide. The dust concentration is determined by the total fiber count above 5 micron. Specifications are included for the phase microscope and lists of firms that can supply equipment are given.

22329

APTIC NO. 41625

ERROR IN NO₂ MEASUREMENTS DISCOVERED.

Chem. Eng. News, 50(26):18, June 26, 1972.

The air in much of the U. S. may be cleaner with respect to nitrogen oxides than was previously believed because of a technical error in the method used to measure nitrogen dioxide concentrations. There are two inherent problems in the currently employed Jacobs-Hochheiser method: a small portion of nitric oxide in the ambient air appears as NO₂, and the collection efficiency varies with the concentration of NO₂. It is the variable collection efficiency that may be a major source of error in the field data used to classify priority I regions for NO₂. Until recently, the Environmental Protection Agency was unable to generate reliable low level NO₂ concentrations over long enough periods of time to calibrate a curve for NO₂ concentrations below 100 micrograms/cu m. This has now been done, and the extended curve shows that collection efficiencies greatly increase with decreasing NO₂ concentrations below 100 micrograms/cu m. The method, as used by the states to report NO₂ levels, uses a constant average correction factor based on a collection efficiency of 35%. Therefore, at lower concentrations of NO₂, where collection efficiencies are much higher than 35%, the calculated and reported concentrations of NO₂ will be higher than the actual ambient concentrations. Field measurements are being conducted to re-evaluate the actual NO₂ levels in the 45 air quality control regions currently classified as priority I for nitrogen oxides. It may be that the number of regions will eventually be reduced to about 30 areas.

22330

APTIC NO. 41770

DISCUSSION OF THE THEMES IN GROUP 2 (ODORIMETRY). (Diskussionen zu Themen der Gruppe 2 (Odorimetrie). Text in German. Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no. 35 39-40, 1971. Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseeldorf, West Germany, March 18, 1971.)

In spite of the shortcomings of a summative determination of hydrocarbons with the flame ionization detector (FID), it is preferred over the summative-C-determination by means of silica gel sampling. With the so-called hydrocarbon analyzers, all substances with C-C and C-H-bonding are analyzed, while the silica gel methods analyze only substances above C₄. None of the substances represent in atmospheric air interferes with the FID. Only a few of the odorants can presently be determined by physical-chemical methods. Aromatics and volatile oils can be rather easily measured, while ammonia, amides, amines, and mercaptans are difficult to determine. Thin-layer-chromatography seems to be promising for the measurement of odor emissions. Objectivation of odor perception seems to be feasible.

22331

APTIC NO. 41905

PROJECT THRESHOLD.

Ind. Wastes, 1972, 24-26, May/June 1972.

Air pollution measurement cannot be effective without standard test methods that are widely accepted. The American Society for Testing and Materials has launched the first known private industry financed U. S. program to validate standard test methods for implementing air pollution control standards

established by the Environmental Protection Agency. The third phase of the multi-million dollar test program, known as ASTM Project Threshold, was completed following week-long tests. Independent teams of 35 researchers made over 1000 measurements of six contaminants in the air over the New York area. Data from the on-site testing, which were fed into a central computer, provided clues to the variables in the test methods and aided the researchers in determining what is and what is not a valid test method for a particular contaminant. (Author abstract modified)

22332

APTIC NO. 42289

NEW CHEMILUMINESCENCE WASTE GAS ANALYZER. (Neuer Chemilumineszenz-Abgasanalysator) Text in German. *Motortech. Z. (Stuttgart)*, 33(6):261, June 1972.

A new chemiluminescence analyzer for the measurement of the oxides of nitrogen in the exhaust gas of Otto and diesel engines was developed. The measurement principle is based on the reaction between nitric oxide and ozone at low pressure at which process nitrogen dioxide is formed. A chemiluminescent energy with a wavelength between 0.6 and 3.0 micron is emitted which is directly proportional to the NO concentration. Through heating of the sample prior to the ozone entry the present NO (double prime) is converted to NO plus O (double prime) and can be included in the measurement. The unit has the following measurement ranges: 0 to 10, 0 to 100, 0 to 1000, and 0 to 5000 ml/cu m. The new analyzer has its own sampling system including pump and filter, an oven for the nitric oxide-nitrogen dioxide conversion, an ozone generator, and a reaction chamber.

22333

APTIC NO. 40970

Anderson, Howard H., Rudolph H. Moyer, Donald J. Sibbett, and David C. Sutherland

AIR POLLUTION DETERMINATION BY MERCURY AIR SAMPLING. (Geomet, Inc., Rockville, Md.) U. S. Pat. 3,640,624, 7p., Feb. 8, 1972. 9 refs. (Appl. April 29, 1970, 8 claims).

A system and apparatus are described for detecting and sampling mercury vapor in the atmosphere, particularly for air pollution determination, utilizing sensitized absorption of the vapor on surfaces of noble metal wire grids. Release of mercury from the grids into a photometer for quantitation is achieved by direct passage of electrical current through the grid wire. The grids are designed to allow for ohmic heating of the absorbent wire to render possible a portable monitoring device. Prior devices were not portable and normally required that the samples of mercury collected from the air or soil be transported to a remote central analytical station. (Author abstract modified)

22334

APTIC NO. 41799

Antcliffe, G. A. and J. S. Wrobel

DETECTION OF THE GASEOUS POLLUTANT SULFUR DIOXIDE USING CURRENT TUNABLE Pb(1-X)Sn(X)Te DIODE LASERS. *Appl. Opt.*, 11(7):1548-1552, July 1972. 12 refs.

Current tunable semiconductor lasers of lead(1-x)tin(x)tellurium were used to investigate the infrared spectrum of sulfur dioxide at high resolution near 1130/cm. The diode lasers emit radiation in a line of width less than 10 to the negative 5th/cm, thus providing much higher resolution than has been possible with the best grating spectrometer. The effects of self-broadening and broadening by nitrogen to 760 torr are presented, and the results indicate that the diode should be suitable for remote sensing applications. Some characteristics of the laser source such as stability and reproducibility are discussed. (Author abstract modified)

22335

APTIC NO. 41612

Araktingi, Y. E., N. S. Bhacca, W. G. Proctor, and J. W. Robinson

ANALYSIS OF AIRBORNE PARTICULATES BY ELECTRON SPECTROSCOPY FOR CHEMICAL ANALYSIS (ESCA). *Spectrosc. Lett.*, 4(10/11): 365-376, Oct.-Nov. 1971. 9 refs.

Particulate pollutants present in the atmosphere can be identified in their different chemical forms by the use of ESC without prior treatment of the air sample. By using the ESC method, oxygen, aluminum, iron, silicon, sulfur, lead, chlorine, carbon, calcium, and nitrogen were identified. Virtually no sulfur dioxide was detected. The nitrogen 1s signal appeared to be composed of peaks generated by at least two chemical forms of nitrogen; however, it was not possible to identify the exact nature of the nitrogen compounds involved. Similarly, broad doublets appearing at 139 and 144 eV suggested that the signals were caused by more than one lead compound. The compounds were identified as lead halide and lead oxide, but no accurate quantitative analysis of their ratio was possible.

22336

APTIC NO. 41967

Arefyev, V. N., A. G. Laktionov, N. K. Nikiforova, L. D. Novikova, and Yu. S. Sedunov

TAKING INTO ACCOUNT SOME OF THE ERRORS OCCURRING DURING THE PHOTOELECTRIC DETERMINATION OF AEROSOL CONCENTRATIONS AND PARTICLE SIZE SPECTRA. (*Ob uchete nekotorykh oshibok fotoelektricheskogo opredeleniya kontsentratsiy i spektra razmerov chastits aerolya*). Text in Russian. *Tr. Inst. Eksp. Meteorol.*, no. 20:115-130, 1971. 7 refs.

Errors involved in the photoelectric determination of aerosol concentrations and particle size spectra by optic instruments were studied. Since the heterogeneity of the light field in the counter volume is dependent on the characteristics of the optic system, it is possible to design instruments with light field homogeneity close to the optimum. The ratio of the vignetted cross section to the total cross section, which ratio is directly proportional to the error, is dependent on the angle, the side dimensions of the counter volume, the distance from the counter to the objectives, and the size of the objectives. Minimum error at an angle of 90 deg was determined, with the errors at 45 and 135 deg about twice as high as that for 90 deg. The effective objective pupil may be, in an extreme case, one tenth of the distance from the pupil to the chamber. The distortion in the particle size spectra was not dependent on the particle size. Minimum deformation of the particle size spectra for particle diameters exceeding the root mean-square value of the diameter and considerable deformations for smaller size particles were also determined.

22337

APTIC NO. 41025

Argirova, M.

REMOVAL OF INTERFERING ACTION OF SULFUR DIOXIDE DURING DETERMINATION OF OZONE IN ATMOSPHERIC AIR. (*Otstranyavane precheschoto deystviye na serniya dyuokis pri opredelyane na ozon v atmosferniya v zdukh*). Text in Bulgarian. *Khig. Zdraveopazvane*, 15(1):93-97, 1972. 15 refs.

A study was conducted to examine new absorbing media for sulfur dioxide during the analysis of ozone. Silica gel was studied in thin layer chromatography and filters impregnated with a solution containing potassium hydrate and potassium carbonate. The results showed no side reactions in determining ozone and a high capacity for absorbing SO₂. The use of these two absorbants in the analysis of ozone is recommended.

22338

APTIC NO. 41287

Ballard, L. F., J. B. Tommerdahl, C. E. Decker, T. M. Royal, and D. R. Nifong

FIELD EVALUATION OF NEW AIR POLLUTION MONITORING SYSTEMS: THE LOS ANGELES STUDY. (INTERIM REPORT). Research Triangle Inst., Research Triangle Park, N. C., National Air Pollution Control Administration Contract CPA-70-101, 218p., 1971. 19 refs.

NTIS: PB 204444

The performance of various ambient air analyzers in the Los Angeles atmosphere was evaluated over a three-month period (Sept.-Dec. 1970). The instruments were installed in a mobile laboratory and used in conjunction with an automated data acquisition system. Most of the analyzers accurately measured oxidant, ozone, sulfur dioxide, hydrogen sulfide, and nitrogen dioxide, but there were significant differences in their levels of performance and in the operator time and materials required to maintain optimum performance. Nonwet chemical techniques such as chemiluminescent detectors, flame photometric detectors (FPD), and gas chromatographic-FPD combinations required the least maintenance and were operational over 93% of the test period. Coulometric and conductometric SO₂ measurements were consistently higher than flame photometric measurements. Among SO₂ analyzers, the FPD was the most stable in terms of calibration reproducibility with a standard deviation of about 0.005 ppm over the range zero to 0.080 ppm. In the oxidant-ozone category, gas-phase chemiluminescence and coulometric instruments had a standard deviation near zero of about 0.001 ppm. The air quality data obtained showed that daytime oxidant is primarily ozone between September and November and that SO₂ represents more than 90% of the total gaseous sulfur in the Los Angeles atmosphere; SO₂ levels frequently exceeded 0.030 ppm in the afternoon. The occasional presence of H₂S and methyl mercaptans was observed. Hourly and daily averages of O₃, oxidants, SO₂, H₂S, and NO₂ during the study period are given together with monthly diurnal averages of oxidants, O₃, and SO₂. Evaluations of meteorological sensors and of the data acquisition and processing system are included.

22339

APTIC NO. 41489

Bartle, E. R., S. Kaye, and E. A. Meckstroth

AN IN-SITU MONITOR FOR HCl AND HF. Preprint. American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, 7p., 1971. 12 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971. Paper AIAA 71-1049.)

A modified nondispersive infrared technique, gas filter correlation (GFC) was established as a sensitive and specific means of measuring pollutant concentrations in the presence of interfering gases. The basic idea of GFC is that a pollutant gas matching the spectral characteristics of the pollutant to be detected can be used in a reference cell and thus provide high specificity. A theoretical analysis of the GFC technique is presented. Experimental results given demonstrate that the technique can be used to measure hydrogen chloride and hydrogen fluoride concentrations of less than 0.1 ppm (Author abstract modified)

22340

APTIC NO. 41611

Baughman, James R. and Paul C. Thys

DROPLET MONITORING PROBE (National Aeronautics and Space Administration, Washington, D. C.) U. S. Pat. Appl. 74,759, 14p., Sept. 23, 1970. (claims not given)

NTIS: N72-15420

A droplet monitoring system is disclosed for analysis of mixed-phase fluid flow in development of gas turbines. The system uses a probe comprising two electrical wires spaced a known distance apart and connected at one end to means for establishing a DC potential between the wires. Each time a droplet of a predetermined minimum size passes through the probe and contacts both wires simultaneously, a signal is coupled by a transformer to an amplifier. A detector will receive the droplet signal and restore the signal to a pulse form suitable for recording by a counter. The transformer isolates any independent EMF generated by the probe which, in many cases, is greater than the voltage signal produced by a droplet.

22341

APTIC NO. 41177

Benarie, M. and D. Bodin

ADAPTATION AND EXPERIMENTS IN THE USE OF A CONTINUOUS APPARATUS FOR MEASUREMENT OF DUST BY BETA RAY ABSORPTION. (*Mise au point et d'utilisation d'un appareil continu pour la mesure de poussières par absorption de rayons bêta.*) Pollut. Atmos. (Paris), no. 35-147-155, July-Sept. 1967. 9 refs. Translated from French. 25p.

The theory and mechanical and electronic operation of an automatic device for continuously measuring dust concentrations in air by means of beta ray absorption is described. The device gathers the dust on a filtering bed with an intermittent movement. Pure fiber glass filter paper is used due to its weak charge loss, good filtration efficiency, good mechanical resistance, and good thermal resistance. The mechanical and electronic components are described. The device was tested in domestic, industrial, and urban areas, and it is concluded that it gives an exact and continuous measurement of the dust concentration. The polyvalence of the device was proven by tests in the atmosphere and in various boiler chimneys. The concentrations measured varied between a fraction of a milligram of solids/cu m gas and several g/cu m. The heat unit over which the experiments were performed ranged from a central heater to a small stove. The device was continuously run for one week in a stoke-hold, with no effects being noted.

22342

APTIC NO. 42068

Benova, Eva

COLORIMETRIC DETERMINATION OF SULFUR DIOXIDE IN THE ATMOSPHERE WITH THORIN AS INDICATOR. (*Kolorimetrické stanovení kyslíku siričitého v ovzduší na indikátor thordin.*) Text in Czech. Chem. Průmysl (Prague), 21(12): 606-607, 1971. 7 refs.

A method for the colorimetric determination of sulfur dioxide in the atmosphere is examined. Atmospheric SO₂ is absorbed in a 0.3% solution of hydrogen peroxide (acidified by 0.01 N hydrogen chloride to pH 4.5) where it oxidizes to sulfuric acid. The H₂SO₄ in an 80% isopropyl alcohol solution (whose pH has been adjusted with perchloric acid to 3.5) is titrated photometrically by barium perchlorate using thordin (APANDS, 2,2-hydroxy-3,6-disulfo-1-naphthylbenzene) as an indicator until the original yellow color changes to a rose-orange color. The color intensity of the barium-thordin complex depends on the solvent (its degree of dissociation); isopropyl alcohol was best suited with the point of equivalence at pH 2.5-4. The sensitivity of the method is 30 micrograms in 10 ml absorption solution; the relative error is 10% using the spectrophotocolorimeter with a titration adapter.

22343

APTIC NO. 42053

Benson, Sidney W., Gilbert R. Haugen, and Roland S. Jackson
DETECTION DEVICE. (Stanford Research Inst., Menlo Park, Calif.) U. S. Pat. 3,647,387. 7p., March 7, 1972. 3 refs. (Appl. March 19, 1970, 13 claims).

The analysis and detection of nitrogen containing compounds has so far relied on nonspecific physical methods such as mass spectrometry or the formation of particulate matter, and the results have not been completely satisfactory. In the present

method, the chemiluminescent reaction of nitric oxide and atomic oxygen is utilized for the detection of nitrogen containing compounds. This reaction yields light with a spectrum peaking in the violet, and this light can be detected by a photomultiplier.

22344

APTIC NO. 41436

Beskova, G. S. and V. S. Filippov

CHROMATOGRAPHIC METHOD FOR THE SEPARATE DETERMINATION OF NITROGEN OXIDES. (*Khromatograficheskii metod razdelynogo opredeleniya okislov azota.*) Text in Russian. Zavodsk. Lab. (Moscow), vol. 2:154-155, 1972. 3 refs.

A method is described for the separate determination of nitric oxide, nitrogen dioxide, and nitrous oxide. A V-shaped column, 3 m long and 4 mm in diameter, packed with a 10% by weight solution of nickel sulfate on SKT type C, at 150 C is used along with a helium carrier gas. The three nitrogen oxides were detected in 8 min in a gas stream, with sensitivities of 3.9, 0.94, and 4.38 times 100 in Porter units. If both carbon dioxide and nitrogen dioxide are present, a V-shaped precolumn, 35 cm long and 4 mm in diameter packed with 0.25-1.0 mm heat-treated Teflon 40 is used to temporarily freeze out the nitrogen dioxide. Such a chromatographic separation and analysis is complete in 11 min.

22345

APTIC NO. 41180

Beyermann, Klaus

THE ANALYTICAL BEHAVIOR OF MINUTE CHROMIUM QUANTITIES. PART 2. (*Das analytische Verhalten kleinster Chrommengen.*) J. Inst. Inorg. Chem. Nucl. Chem. Joh. Gutenberg Univ. (Mainz), vol. 191:346-367, 1962. 55 refs. Translated from German. 38p.

With the aid of radioactive chromium, it is shown that, through extraction by means of isopropylacetone, and through agitation with acetylacetone and addition of butylamine, it is possible to separate Cr in minute quantities. Simultaneous precipitation into hydroxides permits an enrichment from diluted solution. In separating very small amounts of Cr, losses caused by the use of the isotope dilution method must be kept under control. Suitable means for determining minute Cr quantities are provided by colorimetric analysis in capillary cells and by biamperometric measurement with the aid of gold electrodes. Small quantities of Cr can also be detected by means of emission spectrography, flame photometry, X-ray emission spectrography, and polarographic analysis. (Author summary modified)

22346

APTIC NO. 41181

Beyermann, Klaus

THE ANALYTICAL BEHAVIOR OF VERY SMALL AMOUNTS OF CHROMIUM PART 1. (*Das analytische Verhalten kleinster Chrommengen.*) J. Inst. Inorg. Chem. Nucl. Chem. Joh. Gutenberg Univ. (Mainz), vol. 190:4-33, 1962. 51 refs. Translated from German. 46p.

Since the separation of traces of chromium causes difficulties, a detailed investigation of the behavior of very small amounts of Cr in analytical operation was conducted. The behavior of minute amounts of Cr during breakdown is discussed in detail. The oxidation of small amounts of Cr with Na₂O₂, (NH₄)₂S₂O₈ and Ag⁺, and with the aid of other oxidation agents are described. Separations can be conducted at the hexavalent and trivalent stages of Cr. The first permits rather specific separations, but has the disadvantage that oxidation of Cr traces is necessary. Separations at the trivalent stage are of low specificity and permit the separation of the ammonia radicals from the elements, with difficulty. To ensure the analysis results, it is therefore desirable to attempt the separation by both methods and then to compare the results. Several methods of separation for trivalent Cr are described, including separation with acetylacetone, extraction with the addition of

amines, extraction with 8-hydroxyquinoline, and extraction with cupferron. In the hexavalent Cr, extraction may be brought about with isopropylacetone, diphenylcarbazide, and tetraphenyl arsonium hydroxide. Several methods of coprecipitating Cr on hydroxide deposits are also discussed, as well as methods of ion-change separation.

22347

APTIC NO. 41634

Bhagat, Surinder K., William H. Funk, Royston H. Filby, and K. R. Shah

TRACE ELEMENT ANALYSIS OF ENVIRONMENTAL SAMPLES BY NEUTRON ACTIVATION METHODS.

J. Water Pollution Control Federation, 43(12):2414-2423, Dec. 1971. 10 refs. (Presented at the Pacific Northwest Pollution Control Association, 36th Annual Meeting, Seattle, Wash., Nov. 6, 1969.)

The neutron activation method for trace element analysis involves exposing the sample to a high flux of neutrons, which produces radioisotopes that can be identified by their characteristic decay rates and the type and energy of the emitted radiation. Irradiation can be achieved with either thermal or fast neutrons. Limits of detection depend on the element and range from 3 times 10 to the negative 5 to 900 ppb. Size of neutron flux influences the sensitivity. Standardization is accomplished with solutions of known composition. Precautions must be taken to avoid sample contamination because of the low concentrations involved. The technique may be used in investigating pollution and nutrients and in other applications. To demonstrate the technique of neutron activation analysis, samples of lake waters and algae and samples of waters from wastewater receiving streams in eastern Washington were collected and irradiated. Twenty-one trace elements were determined.

22348

APTIC NO. 41106

Blum, W.

ANALYSIS OF AUTOMOBILE EXHAUST GASES (GASOLINE ENGINES). DIRECTLY COUPLED CAPILLARY COLUMN - FINNIGAN MODEL 3000. (Analyse von Autoabgas (Ottomotor). Direktkopplung Kapillarkolonne - FINNIGAN Modell 3000). Text in German. Preprint, Finnigan, Munich (West Germany). Jp., Dec. 12, 1971. 4 refs.

The permissible limit of carbon monoxide content in automobile exhaust of gasoline engines is established by West German law at 4.5% which is above the limit allowed in the U.S.A. Official regulations also apply to limits concerning concentration of nitric oxides and unburned hydrocarbons. In the analysis of these three groups, the determination of the hydrocarbons presents the maximum difficulties. One problem is the separation of the numerous hydrocarbon isomers; the other problem, the identification of the individual components which often occur in traces only. The experimental determination of hydrocarbon components in the exhaust during idling shortly after a cold start is described; separation and identification of hydrocarbons was carried out by means of a combination of a gas chromatograph with a quadrupole mass spectrometer. A glass cylinder of 1000 cu cm volume, fitted with glass shut-off cocks at both ends, was evacuated and then connected to the exhaust gas outlet for a few seconds. After disconnecting and warming up the cylinder, a sample of one cu cm for testing was taken by means of a gastight syringe.

22349

APTIC NO. 42002

Bugan, D. J., C. W. Hand, and R. H. Ohenau, Jr.

AN OZONE FLOW METERING SYSTEM. *Rev. Sci. Instr.*, 43(2):348-349, Feb. 1972. 4 refs.

A device to measure ozone flow rates in the range from 5 times 10 to the minus 9th power to 10 to the minus 5th power mole/sec has been designed and built. Flow measurement is accomplished by timing the pressure drop from a calibrated

volume, along with simultaneous photometric determination of the ozone partial pressure. A trap containing ozone absorbed on 200 g silica gel at -64 C is used as the ozone reservoir. The partial pressure of ozone and oxygen above the trap depend on the extent of saturation of the silica gel, the temperature at which the ozone was originally trapped, condition of the silica gel, and the thermal history of the trap after loading. The error of the photometer is or 3% and or - 0.6% at one and five torr respectively. Error between successive reading of the change in pressure with respect to temperature is normally or 5%.

22350

APTIC NO. 41635

Boos, L. E. and J. D. Wirefordner

RADIO FREQUENCY SPECTRAL EMISSION DISCHARGE DETECTOR FOR FIXED GASES. *Anal. Chem.*, 44(6):1020-1026, May 1972. 12 refs.

A radio frequency spectral emission detector for detection of fixed gases was designed and evaluated. A description of the instrumental system is given, along with information regarding the response of the detector to air, carbon monoxide, carbon dioxide, sulfur dioxide, ammonia, nitric oxide, nitrogen, nitrogen dioxide, and methane. The radio frequency (8 MHz) plasma was initiated and sustained by a low power-modified Clapp oscillator. The background spectrum (2000-5000 A) resulted from nitrogen, NH, nitric oxide, and hydroxide molecular band emission due to impurities in the helium and of the platinum electrodes were also identified. Limits of detection ranged from 0.3 ppm for carbon monoxide to 2.4 ppm for methane. (Author abstract)

22351

APTIC NO. 42019

Bourbon, P., R. Malbos, and M. J. Bel

CONTRIBUTION CONCERNING SULFUR DIOXIDE DETERMINATION ON A DRY ABSORBENT: APPLICATION TO POLLUTED AIR. STABILITY STUDIES.

(Contribution a la determination du dioxyde de soufre sur absorbant sec: application aux atmospheres polluees. Etude de la stabilite). Text in French. *Cent. Belge Etude Doc. Eaux*, 25(341): 182-186, April 1972. 4 refs.

A method using glycerinated zinc acetate on cellulose filter as a dry absorbent as well as pyridine and nitroprussiate as reagents for colorimetric sulfur dioxide determination, its practical application to industrial and urban atmospheres, and studies on the stability of the sulfite formed on the dry absorbent are described. The calibration curve for the colorimetric determination is linear within a range of 0.250 micrograms/10 ml, and the absorption maximum lies at 490 nanom. The stability of the SO₂ was dependent on the sampling duration, air humidity, and the nature of pollutants accompanying SO₂. The sulfite formed on zinc acetate treated with 10% glycerine was stable over 24-hour sampling, and its stability was not affected by high humidity or other pollutants. Exposed filters, packed in plastic bags, can be stored over 20 days after sampling without the risk of impaired stability. 0

22352

APTIC NO. 41064

Boyev, I. Ya., Ye. G. Levkov, V. A. Limanskiy, V. P.

Bugayev and A. S. Levkova

SAMPLING, SEPARATION AND FLUORINE DETERMINATION TECHNIQUES IN ALUMINUM MANUFACTURING PLANT-PRODUCED ELECTROLYSIS DUSTS. (Metodika otbora prob, otdeleniya i opredeleniya flora v elektroliznykh pylyakh alyuminiyevogo proizvodstva). Text in Russian. *Zavodsk. Lab. (Moscow)*, 38(3):278-281, 1972. 3 refs.

Various filter materials were tested and optimum conditions of fluorine separation and determination were determined. The dust samples were collected with a 0.074-micron filter made of carbon fibers. The retention for finely dispersed dust was above 99%. Preliminary extraction of hydrocarbons by benzene or trichloroethylene was followed by high-efficiency

hydropyrolytic separation in the presence of vanadium pentoxide as catalyst. The optimum conditions for the above procedure were a maximum temperature of 1100 C in the reaction zone, 95 C in the steam generator, a vapor-air mixture flow rate of 1.2 l/min, a dust sample-to-catalyst ratio of 1:1, and a reaction time of 60 min. The hydrogen compounds of fluorine that were obtained were absorbed in a basic solution. A current measurement method, based on the Zirconium substitution of iron ions in their fluoride complexes, was used for analysis. Titration with zirconium oxichloride was made after hydrochloric acid was added. The recording of the equivalent points provided high accuracy. A platinum electrode and saturated calomel were applied as reference electrode.

22351 APTIC NO. 42003

Brasser, L. J., L. A. Clarenburg, H. de Graaf, and J. R. Pruys.
CONCISE PRESENTATION OF SO₂-CONCENTRATION DATA COLLECTED FROM A REGIONAL NETWORK OF VOLUMETRIC SO₂ SAMPLERS. *Atmos. Environ.* 5(7):505-509, July 1971. 1 ref.

Compact but nevertheless informative presentation of vast amounts of air pollution data is achieved by calculating the percentage of time that a specified gas concentration is exceeded per station and per period, and plotting the data and mapping the areas in which the various percentages occur. Maps are presented of a polluted area in western Netherlands with isolines showing the percentage of time the sulfur dioxide exceeded 350 micrograms/cu m. The method can be applied with ease to all the other gaseous pollutants. (Author abstract modified)

22354 APTIC NO. 41190

Breuer, Hans.
SIGNIFICANCE OF THE PARTICLE SIZE DISTRIBUTION IN THE MEASUREMENT AND CONTROL OF SUSPENDED DUST IN COAL MINING. *Staub (English Translation from German of: Staub, Reinhaltung Luft.* 29(3): 22-32, March 1969. 15 refs.

The particle size of coal dust particles, which has a decisive influence upon the deposition and retention in the lungs and alveoli was measured. The instrument separated nonrespirable dust by a cyclone and was used for determining the characteristic value for fineness of suspended dust and of its components. This characteristic value showed the influence of particle size distribution on the scattered light intensity for fine dust, measured by a Tyndall cone and on the scattered light intensity for konimeter dust samples, measured photometrically. The measured value for dust, obtained by gravimetric dust measuring instruments during different preliminary separations, comprises the different particle size distributions of suspended dust and the different separation characteristics of the preliminary separators. In the case of suspended dust precipitation from an air current by water drops and in the case of dust removal by suction and precipitation in dust removal installations, the particle size distribution has essential influence on the separation efficiency. (Author summary modified)

22355 APTIC NO. 42103

Breuer, Wolfram.
THE SCOPE OF AUTOMATIC ANALYSES IN AIR POLLUTION CONTROL. (*Die Aussage automatischer Analysen in der Luftüberwachung*). Text in German. *Chem. Tech. (Berlin)*, 1(5):207-210, 1972.

Emission supervision within a large chemical plant serves the purpose of recording the level of pollution, identification of sources of pollution, and of the mechanism of its spread. The Farbenfabrik Bayer began its emission monitoring by automatic continuous measurement of sulfur dioxide concentrations in a few selected sites, but the data recorded were of comparatively little value until correlated with wind direction

and velocity. Only then was it possible to estimate the distance and direction of the source from the pollution curve. Subsequent introduction of simultaneous carbon dioxide monitoring contributed significantly to the identification of pollution sources because, while SO₂ from the manufacture of sulfuric acid never contains CO₂, that from combustion always contains CO₂ as the principal combustion product. Also, parallel SO₂/CO₂ monitoring made possible differentiation between different sources of combustion. Similarly, continuous monitoring nitrogen oxides contributed to source identification. The monitoring network, designed to monitor pollution of the Leverkusen-Domagen area, comprises, aside from many simple measuring stations, four large stations monitoring continuously nine different pollutants and meteorological parameters. Median 30 minute averages are automatically punched on cards which are evaluated monthly, quarterly, and yearly by a computer. From this documentation fluctuations and trends emerge. Quantitative analysis by means of linear equations makes it possible to determine the share of individual sources on the overall emission, which is especially important in industrial agglomerates during unfavorable weather conditions.

22356 APTIC NO. 42001

Brooks, J. D. and W. E. Wolfram.
TRACE MERCURY DETERMINATION. *Am. Lab.* 3(12):54-58, Dec. 1971. 14 refs.

Some practical methods for the determination of trace mercury are discussed as well as information on the selection of reagents, sample handling, and the use of equipment. Emission spectroscopy has a detection limit of 100 ppm for a 10 mg sample. Flame emission photometry has a normal detection limit of 0.5 ppm which can be improved by extraction to 0.1 ppm. Mercury in air may be measured with two techniques. One method uses the photometric measurement of dithionite extract after air has been drawn through a sulfonic acid solution of potassium permanganate reduced with hydroxylamine hydrochloride. A second air measurement system employs the so-called mercury meter, using mercury vapor light and a photometer, but may suffer interference by smoke and aerosols. Extraction photometry is sensitive to 0.1 ppm for solid samples. Biological contamination is frequently measured with neutron activation analysis, but this method is slow and expensive. Gas chromatography is specific for organic complexes, but does not measure inorganic mercury at all. Cold vapor atomic absorption has been routinely employed in some labs and is sensitive to 0.004 ppm.

22357 APTIC NO. 41493

Brown, V. and K. Tamstorf.
A NEW ALL SOLID STATE APPROACH TO GASEOUS POLLUTANT DETECTION. Preprint. American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, 3p., 1971. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971. Paper AIAA 71-1114.)

The combination of thin film electrodes and solid electrolytes can yield a variety of interesting chemical cells which are electrocatalytically sensitive to numerous pollutant gases. By judicious choices of electrode materials, bias voltage polarity and magnitude, and selectively permeable membranes, one can develop small inexpensive sensor structures which show excellent specificity to pollutant gases of interest. When in volume use, the sensor plate would be quite inexpensive and expendable. The readout electronics for a simple one gas analyzer would be relatively inexpensive.

22358

APTIC NO. 41769

Burchard, H.

LOCALIZATION OF ODORS BY MEANS OF GAS CHROMATOGRAPHY. (*Lokalisierung von Geruchsstoffen mittels Gaschromatographie*). Text in German. *Schriftenreihe Ver. Wasser-Boden-Luftthyg. (Berlin)*, no. 35:35-38, 1971. (Presented at the Colloquium *Geruchsbelastigende Stoffe*, Duesseldorf, West Germany, March 18, 1971.)

In order to locate an annoying odor in Wuppertal, West Germany, air samples were taken by drawing 100 l air through a silica gel-filled adsorption tube, which was desorbed in the laboratory at 250 C. Since the odors were particularly noticeable with southeastern winds, waste water samples of the inflow into the municipal purification plant, located in the South-east, were also taken. Samples from the waste water from a chemical plant which entered into the municipal purification plant were taken in addition to samples from the water discharged by the purification plant into the receiving stream. The prepared samples were analyzed by gas chromatography. Columns with a length of 2 m were used. Helium was the carrier gas. In the waste water of the municipal sewers, 1.6 mg volatile hydrocarbons/l were measured; in the waste water discharged by the chemical plant, 160 hm g/l; in the outflow from the purification plant, 14 mg/l, and in the air, up to 15 mg/cu m. Four substances produced the same peaks in the air samples, in the waste water samples from the chemical plant, and the samples from the outflow of the purification plant. They were substances with a strong odor reminiscent of thio-compounds. All four substances were not found in the municipal waste water. Further investigations revealed that a large part of these substances reached the receiving stream completely intact, spreading the odor there. These results pinpointed the source of the odor and preventive measures could be taken.

22359

APTIC NO. 40987

Cahill, T. A. and R. Sommerville

AUTOMATIC ANALYSIS OF ATMOSPHERIC AEROSOLS FOR RESEARCH AND MONITORING PURPOSES. *Trans. Am. Nucl. Soc.*, 15(1):70-71, June 18-22, 1972. 4 refs.

Accelerator-produced beams of protons, alpha particles, and heavy ions, by inducing characteristic x-rays, can provide a means for performing elemental analysis of microsamples to nanogram sensitivity or better. Therefore, a system for analyzing aerosol samples was designed and constructed for use with the Davis 76 in. isochronous cyclotron. The system has been operational for several months. The system is based on excitation of aerosol samples from filters or impactors by alpha particle beams with energies between 15 and 40 MeV. The beam passes through four samples at a time. The beam is then collected by a Faraday cup to provide absolute values for the data. The first two stations have automatic sample changers based on 35 mm slide trays, with the samples mounted in cardboard slide frames, and silicon (lithium) detectors possessing excellent resolution and dead-time correction at high count rates. Stations three and four are designed to handle aerosol samples impacted on beryllium foils. By using elastic alpha scattering, it is possible to analyze elements between boron and calcium. Values are given in ng/cu m for all elements detected, including errors, and upper limits are given for elements not observed. With samples optimized to the system, research analyses requiring sensitivity of about 1 ng/cu m air are run for about \$5.00 apiece, while monitoring samples, needing 10 ng/cu m sensitivity, cost between \$1-2 apiece. A 60% reduction in costs is expected with completion of a second x-ray station.

22360

APTIC NO. 47070

Carroll, H., B. Dimitriades, and R. M. Ray

A CHEMILUMINESCENCE DETECTOR FOR OZONE MEASUREMENT. *Bureau of Mines, Pittsburgh, Pa., Rept. 7650*, 17p., 1972. 14 refs.

An ozone detector was built and evaluated for its applicability in smog-chamber studies. The detection method is based on the reaction of ozone with ethylene and the measurement of resultant chemiluminescence. In the first phase of evaluation, the detector response to ozone was studied as a function of RMT anode voltage, ethylene and sample flow rates, and the pressure of the gas mixture in the reaction chamber, and optimum conditions were defined for the maximum and most stable responses to ozone. In subsequent evaluations, the method was checked for sensitivity, precision, and interferences and was compared with two alternative methods. The chemiluminescence method was acceptably sensitive and precise for smog-chamber studies and superior to the Mast ozone meter and KI (colorimetric 1 percent neutral-potassium iodide method) methods in that it is specific for ozone. (Author abstract modified)

22361

APTIC NO. 41026

Centola, Paolo, Giovanni Terzaghi, and Renato Del Rosso

A CONTINUOUS ANALYTICAL METHOD FOR THE DETERMINATION OF SMALL AMOUNTS OF SO₂-SO₃ CONTAINED IN GAS MIXTURES BY MEANS OF GAS CHROMATOGRAPHY. (*Tecnica di analisi in continuo per via gascromatografica di miscele gassose contenenti SO₂-SO₃ in piccola percentuale*). Text in Italian. *Chem. Ind. (Milan)*, 54(3):218-221, March 1972. 25 refs.

The continuous gas chromatographic method for the analytical determination of small quantities of sulfur dioxide and sulfur trioxide in the atmosphere uses a column filled with Voltaflex 3X and Voltaflex 300 LD CHR, low molecular polymers of trifluoromonoethylenes, and a simplified version of the Gow Mac Gade density balance measuring cell whose measuring resistances never get in contact with the corrosive gas to be analyzed but only with the reference gas (nitrogen). The SO₂ in the gas is first continuously catalytically oxidized in an electric oven to SO₃, cooled and then injected into the gas chromatograph. Determination is based on the potentiometric measurement of the tension created on the ends of a Wheatstone bridge caused by the flow imbalance created by the injection of the sample gas into the reference gas circuit. The density of the sample gas which is larger than that of the reference gas creates an occlusion in a system of appropriately designed capillary glass tubing which is proportional to the SO₃ content in the sample gas resulting in internal variation of gas flow velocities continuously recorded by means of sensitive anemometers recording velocities of the order of .0014/cm corresponding to density differences of 0.5 times 10 to the -8th power g/cu m. The measurement threshold of the method is 0.1% SO₂+SO₃, its accuracy 1.2%. While it is less sensitive than methods based on the measurement of thermal conductivity, it is continuous, permits analysis of corrosive gases, and is stable even with considerable quantities of sample gas.

22362

APTIC NO. 41591

Chen, Che Jen and Frank Wu

RAMAN SCATTERING CROSS SECTION FOR N₂O₄.

Appl. Phys. Letters, 19(11):452-453, Dec. 1, 1971. 2 refs.

Raman scattering cross sections can be used to detect atmospheric gases. The unique feature of Raman scattering is that the shift in wavelength is a characteristic property of the gases studied. The Raman scattering cross section for dinitrogen tetroxide, 1.4 times 10 to the minus 31st power cm squared, at a Raman shift of 1360/cm is measured using a Q-switched laser as the excitation source. The measured cross section for nitrogen gas, 2.3 times 10 to the minus 30th power cm squared at a Raman shift of 2330/cm differs from a previ-

ous determination of 8.3 times 10 to the minus 30th power cm squared.

22363

APTIC NO. 42154

Childs, Elbert B.

ANALYTICAL APPARATUS AND METHOD FOR SMOKE AND GASES. (Mobil Oil Corp., Princeton, N. J.) U. S. Pat. 3,653,773. 12p., April 4, 1972. 6 refs. (Appl. March 16, 1970. 8 claims).

A method for indicating the amount of solid, non-white contaminant suspended in a gas is described, which comprises the steps of forming a gas stream and moving a filter tape through the stream. The method also includes the generation of a signal representative of the amount of contaminants filtered from the stream by the tape, and an automatic indication of the number of times the signal exceeds a predetermined value for a predetermined period of time. By providing for fast interpretation, the device is particularly useful in field investigations where compliance with smoke regulations is involved. A photocell is used to provide an output signal to a meter.

22364

APTIC NO. 42160

Chow, Tsai-hwa J. and John L. Earl

LEAD ISOTOPES IN NORTH AMERICAN COALS. *Science*, 176(4034):510-511, May 1972. 7 refs.

The lead contents of 143 coal samples, which contain an average of 11 ppm of lead, were determined. Some 21 samples were selected analyzed for their lead isotopic composition. The isotope ratios show that coal leads are equally or much more radiogenic than the average lead in the continental crust. By comparing the isotopic composition of the lead in North American coals with that of the lead in gasoline additives, it is found that, except for coal 101 and the Houston gasoline, there is a distinct difference between these two sources of lead pollutants. The Houston gasoline contains some anomalous J-type lead, which is characteristic of the Mississippi Valley lead ore, and coal 101 is from a Montana coal mine that is not a major producer. Therefore, it is practicable to distinguish between gasoline and coal leads by examining their isotopic composition.

22365

APTIC NO. 41107

Cohen, Wilfried

MEASUREMENT AND EVALUATION OF HARMFUL SILICOGENOUS DUST CONCENTRATIONS OCCURRING IN OCCUPATIONAL ENVIRONMENTS OF INDUSTRIES INVOLVING THE ABOVE DUSTS. (*Messung und Beurteilung der Konzentration gesundheitsschädlicher, insbesondere silikogener Staube an Arbeitsplätzen der obertägigen Industrie*). Text in German. Staub, Reinhaltung Luft, 31(12):484-490, Dec. 1971. 11 refs.

For assessing whether measured values are below maximum allowable concentrations (MAC), it is not sufficient to directly compare short-time measurement results with MAC values. Due to fluctuations in harmful dust concentrations in the course of, for example one year, and also in view of variations in the time periods during which a worker is exposed to such conditions, one may consider the MAC value as undoubtedly exceeded if one third of a measured one-hour average value is larger than the MAC value. Conversely, the MAC value can be considered as definitely not exceeded if triple the measured one-hour average value is smaller than the MAC value. A number of other suggestions are made with regard to the strategy of measuring, such as the choice of time and place of sampling, the decision on upper particle size limit up to which the dust particles are to be taken into consideration for the assessment of noxious dust concentration, and the use of corrective factors to convert a one-hour average measured value to an approximate average value applicable to a longer time period.

22366

APTIC NO. 42084

Cohen, E.

DETERMINATION OF TRACES OF HEAVY METALS IN AIR BY POLAROGRAPHY AND ANODIC STRIPPING. (*Determination de microquantités de métaux lourds dans l'air par polarographie par redissolution anodique*). Text in French. Bull. Soc. Chim. France, no. 1:416-419, Jan. 1972. 11 refs.

Instrumentation and techniques were developed for voltametric simultaneous analyses of toxic metals in air, including lead, cadmium, copper, and zinc. The evaporated nitric acid extract of the aerosol sampling filter is dissolved in hydrochloric acid and subjected to preelectrolysis, during which the metals form amalgams at the mercury drop. A linear potential sweep then yields individual peaks which result from the oxidation of each amalgamated metal and whose heights are proportional to the original metal concentration. In the 0.5 to 10 microgram/cu m range, the method is accurate to within 5 to 15%.

22367

APTIC NO. 41801

Collins, G. G. and D. Utley

SIMPLE MEMBRANE INLET FOR DIRECT SAMPLING OF ORGANIC POLLUTANTS IN THE ATMOSPHERE BY MASS SPECTROMETRY. *Chem. Ind. (London)*, no. 284, Jan. 1, 1972. 1 ref.

A rapid response mass spectrometer inlet system, free of dead space and operating on the diffusion principle, uses a 0.025-mm thick methyl silicon rubber membrane on a 150 mesh electron microscope grid support. The system is useful in detecting trace amounts of organics, such as Freon 113, in the atmosphere. The system was sensitive to 0.1 ppm Freon 113.

22368

APTIC NO. 41941

Dalu, G. and G. A. Dalu

AN AUTOMATIC COUNTER FOR DIRECT MEASUREMENTS OF RADON CONCENTRATION. *J. Aerosol Sci.*, 2(2):247-255, June 1971. 4 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

The counter consists of a brass chamber, into which the air to be examined flows continuously at 4 l/min. Within the chamber there is a zinc sphalerite(silver) scintillator, optically coupled with a photomultiplier. The scintillator is coated with a thin film of gold to render it conductive and, between the chamber and the scintillator, a potential of 1000 V is applied. The positive radon A ions are thus electrostatically collected on the scintillator, where their subsequent alpha decays and those of radon C prime produce scintillations. The construction and the calibration of the counter is described. The calibration is achieved by admitting into the chamber known amounts of radon grown from a radium chloride solution. The methods of sampling and measurement for the evaluation of radon atmospheric concentrations are described. The automatic counter can work for many days without interruption. The only maintenance required is the reloading of paper recording tape and the control of contamination by radon D ions, approximately every 20 days. (Author abstract modified)

22369

APTIC NO. 40985

Denec, P. B. and R. L. Stein

AN EVALUATION OF DUST SAMPLING MEMBRANE FILTERS FOR USE IN THE SCANNING ELECTRON MICROSCOPE. *Powder Technol. (Amsterdam)*, vol. 5:201-204, 1971. 13 refs.

Four membrane-type filters of nominal 5 micron pore size were studied by scanning electron microscope to determine their relative feasibility for use in a study of the behavior of dust and its relation to pneumoconiosis. The Gelman, Millipore, Flotronics, and Nuclepore were selected for their minimum air flow resistance and collection efficiency approaching 100%. Electron microprobe showed that the Gelman

and Millipore filters had different back and front faces and different relative porosity depths. The Flotronics filter is ideal for the study of the carbon content of coal dust and both sides are identical, though rough. The Nuclepore has uniform circular holes distributed on a relatively smooth surface. The Nuclepore type membrane filter appears to be the best type of filter to use when dust is to be sampled for SEM analysis. This filter with its extremely simple geometry presents a system which can be theoretically analyzed, and closely resembles the theoretical capillary model.

22370

APLIC NO. 41528

Dietz, W. A.

CALIBRATION DATA FOR GAS CHROMATOGRAPHIC ANALYSIS OF PHENOLS. *J. Chromatographic Sci.* 10(6):423-424, June 1972. 2 refs.

A method was developed to measure individual phenols as they occur in auto exhaust. It involved preparing a phenol concentrate which is then analyzed by capillary gas chromatography. Calibration data for the gas chromatography measurement are presented. The best column for resolving phenols is one coated with a mixture of 90% didecyl phthalate and 10% phosphoric acid. Operating at 120°C, essentially all phenols through ethyl and dimethyl as well as many of the propyl, trimethyl, and higher homologs were resolved. In all cases symmetrical peaks occur. Retention data and relative sensitivity values to a flame ionization detector were measured to provide calibration data. Twenty-three phenols were studied. The data are shown in tabular form.

22371

APLIC NO. 42125

Dmitriyev, M. T. T. V. Solov'yeva, L. P. Serbina, and S. A. Fomina

SEPARATE DETERMINATION OF NITROGEN OXIDES IN THE ATMOSPHERE (*Razdel'noye opredeleniye oksidov azota v atmosfere vozdukh*). Text in Russian. *Gigiena i Sanit.* 36(9):60-64, Sept. 1971. 7 refs.

An analytical method for the separate determination of nitric oxide and nitrogen dioxide was elaborated, and practical measurements were performed. Experiments on the oxidation of NO to NO₂ by hydrogen periodate, persulfate, peroxide, potassium permanganate, dichromate, and beta and ultraviolet radiation or high-frequency electric discharge in hermetic chamber with a NO concentration of 1.7-6.7 mg/cu m revealed potassium permanganate in acid medium to be the best oxidizing agent. Solid sorbents such as diatomite (grain size 0.1-0.2 mm) or powdered glass (grain size 0.25-0.5 mm), impregnated with 3% potassium dichromate solution in 2.5% sulfuric acid, were best for NO determination. The oxidation degree for diatomite and powdered glass ranged from 97 to 99.9%. The sampling for NO₂ determination was made in 0.5 n-potassium iodide solution and photoelectric determination with Griess-Ilosvay solution in 1 cm-cuvette was applied. The sensitivity was 0.3 micrograms. An analytical technique using two absorbers for NO and NO₂ at a sampling rate of 0.1-0.2 l/min was developed on the basis of the above investigations. High atmospheric humidity caused the results obtained for NO to be too low, while the influence of ozone was negligible. The relationship between the nitrogen oxides concentration in the sample and the optical density was established. The nitrogen oxides concentration, measured near a highway, was below 0.5 mg/cu m, while the NO to NO₂ ratio was most often in a range of 1.3-2, and also ratios of 10-15 occurred. Nitrogen dioxide accounted, on an average, for 78%. The proportion of NO as measured at explosion sites in mines or in automotive exhaust was 8-10 and 20-30 times that of NO₂. Nitrogen oxides concentrations of 20-30 mg/cu m with a NO to NO₂ ratio of 15-20 on a highway were measured.

80

22372

APLIC NO. 41039

Dorokhov, G. I., S. S. Taravkov, and Ye. D. Fomenko

SOLID FUEL BURNING DETECTORS. (*Datchiki vyzhiga (tverdogo topliva)*). Text in Russian. *Elektr. St. (Moscow)*, no. 2:21-23, 1972. 4 refs.

A new detector for the continuous measurement of the unburned content in anthracite dust fly ash is described. The detector is based on the principle of the active or total resistance measurement in a resistance bridge fed with direct or alternate current, respectively. The four different components of the anthracite dust fly ash are quartz, aluminum oxide, limestone and iron oxides. Though the electric resistivity varies within a wide range, the detector has high sensibility and accuracy. Hyperbolic function was determined for the active resistance and the temperature up to 100°C, and rapid increase in resistance above 100°C was observed. Variations in the temperature are compensated for by a compensating resistor, but a thermistor may be preferable due to the non-linearity of the above compensation. Increased fly ash humidity caused considerable decrease in the electric resistance. Linear resistance-pressure dependence was determined, practically irrespective of the anthracite granulometric composition.

22373

APLIC NO. 41048

Drasche, H. and H. W. Beckenkamp

DETERMINATION OF DUST AT WORKSHEET FROM THE OCCUPATIONAL MEDICINE POINT OF VIEW. (*Mesures des poussières au poste de travail sous l'angle de la médecine du travail*). Text in French. *Arch. Maladies Profess. Med. Trav. Sécurité Sociale (Paris)*, 32(3):783-288, March 1971.

Measurement of the exposure of workers to airborne dust in their work requires care to insure that the measurement is actually of the dust to which the worker is exposed. Use of the usual dust measurement methods does not readily allow a close correlation to be established between measured values and the amount of dust absorbed by men. In order to obtain results more closely approaching actual dust absorption, gravimetric measurements by means of fixed instruments at workplaces and by means of portable instruments attached to workers back, volumetric measurements, and measurements obtained with filter masks worn by workers were conducted in an iron foundry. Measurements taken by means of portable gravimetric instruments are valuable. For greatest efficiency, measurements must be taken throughout the working day; over a 5-day period; since the varying degree of effort entailed by different tasks affects the dust absorption rate, this must be taken into account when evaluating exposure.

22374

APLIC NO. 41478

Driscoll, J. N. and A. W. Berger

IMPROVED CHEMICAL METHODS FOR SAMPLING AND ANALYSIS OF GASEOUS POLLUTANTS FROM THE COMBUSTION OF FOSSIL FUELS. VOLUME I: SULFUR OXIDES. (FINAL REPORT). Walden Research Corp., Cambridge, Mass. Contract CPA 22-69-95. APID-1106. Air Pollution Control Office, 270p., June 1971. 352 refs.

NTIS: PB 209267

The recommended methods for collection and analysis of the oxides of sulfur (sulfur dioxide and trioxide) and correlation of the combustion source with the current sampling and analysis techniques are presented in detail. The condensation method with the proper modification is best for both field and laboratory sampling of SO₃. Absorption in 80% isopropanol has been used but ranks second in desirability to controlled condensation. The collection in hydrogen peroxide is the most precise field sampling method for SO₂, and dry sulfate method may be used for analysis because of the easy decomposition of H₂O₂. The barium chloranilate and barium perchlorate titration with thionin have demonstrated the greatest precision of all

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22379

the sulfate analyses. Barium chloranilate is recommended for its objectivity. Sampling time must be adjusted to fit the process being sampled as well as the sulfur species sought. The best present methods of SO₂ determination in the range 500-2,500 ppm yield a precision of plus or minus 3%. Analyses for SO₃ had a precision of 10-20%; the condenser method improves this to plus or minus 5% at 10 ppm. Considerable effort must now be devoted to the collection of a statistical base for sampling. Included in this text are detailed descriptions of all methods discussed. Chemistry of SO_x in flue gases is discussed. Source sampling, flue gas flow measurements sampling, probes, and colorimetry, turbidimetry, conductivity, iodimetry, and other analytical methods are mentioned. 0

22375

APTIC NO. 41486

Driscoll, J. N. and A. W. Berger

IMPROVED CHEMICAL METHODS FOR SAMPLING AND ANALYSIS OF GASEOUS POLLUTANTS FROM THE COMBUSTION OF FOSSIL FUELS. VOLUME II: NITROGEN OXIDES. (FINAL REPORT). Walden Research Corp., Cambridge, Mass., Air Pollution Control Office Contract CPA 22-69-95, APTD-1108, 179p., July 1971. 161 refs.

NTIS: PB 209268

The recommended methods for sampling and analysis of the oxides of nitrogen and the detailed statistics of NO_x determinations are presented as well as detailed descriptions of all current sampling and analytical techniques. The phenol disulfonic acid (PDS) method has gotten the most acceptance of all the methods because of its accuracy, but PDS is time consuming and difficult and will probably be replaced by the less accurate nitrogen electrode. If successfully developed, solid sorbents may yield considerably higher precision and speed than any method presently employed. All NO_x determinations require grab sampling; integrated grab sampling could improve results. Spectrophotometric, Saltzman, and potentiometric methods are discussed. Calibration is mentioned. The chemistry of nitrogen oxides is mentioned including kinetics, reactions with sulfur dioxide, oxidation of nitric oxide, and absorption. Nitrogen dioxide, NO, nitric acid, nitrous oxide, nitrogen trioxide, and nitric anhydride are mentioned.

22376

APTIC NO. 41662

Driscoll, J. N. and A. W. Berger

IMPROVED CHEMICAL METHODS FOR SAMPLING AND ANALYSIS OF GASEOUS POLLUTANTS FROM THE COMBUSTION OF FOSSIL FUELS. VOLUME III: CARBON MONOXIDE. (FINAL REPORT). Walden Research Corp., Cambridge, Mass., Air Pollution Control Office Contract CPA 22-69-95, APTD-1109, 70p., July 1971. 267 refs.

NTIS: PB 209269

The iodine pentoxide method with iodometric finish is the best wet-chemical reference method for the laboratory. The simpler Hopcalite catalytic oxidation should provide similar performance, especially if the range is limited to levels about 10 ppm. The efficiency of Hopcalite is greater than the 97-99% of I₂O₅. Even if the I₂O₅ method is retained, determination of carbon dioxide formed would eliminate the interferences of H₂O and H₂. Much of the sensitivity of the I₂O₅ method to temperature changes is thought to result from spontaneous I₂O₅ decomposition; if CO₂ were measured this problem would be eliminated. Oxidation by a catalyst is the only feasible alternative to grab sampling for subsequent laboratory analysis provided quantitative scrubbing of interfering flue components can be achieved. The volumetric and gravimetric methods should be eliminated because they lack sensitivity and require a great deal of skill. However, collection in copper ion scrubbing solution has promise as a result of the high solubility of carbon monoxide. Methods involving hemoglobin are not attractive since they require removal of oxygen from both the blood and the gaseous sample for reliable results. The pal-

ladium chloride-bis(O-phenanthroline) and silver p-sulfaminobenzoic acid methods are very attractive because of their selectivity and simplicity. However, grab sampling techniques must be employed and the analysis time is long. The chemistry of CO in flue gas is mentioned. (Author summary)

22377

APTIC NO. 41491

Feldstein, M. and D. A. Levaggi

THE DETERMINATION OF ATMOSPHERIC FLUORIDE WITH A SPECIFIC ION ELECTRODE. Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, 4p., 1971. 13 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971. Paper AIAA 71-1116.)

Lime-coated filter paper can replace the use of indicator plants and proves to be an inexpensive and reliable method for detecting atmospheric fluoride. A large number of exposure sites are necessary to assure accuracy. A fluoride electrode and an expanded pH meter can be used for the rapid measurement of fluoride concentrations down to 0.02 ppm. Normal background concentrations are under 10 micrograms/mo; fluoride sources increase values to as much as 150 micrograms/mo.

22378

APTIC NO. 41062

Fenimore, Charles P.

OXIDATION OF SULFUR DIOXIDE IN STAINLESS STEEL OR INCONEL SAMPLING PROBES. Combustion Flame, 18(3):469-470, June 1972. 1 ref.

The use of quartz or quartz-lined probes is necessary in exhaust emission monitoring. Typically, 10-15% of all the sulfur collected in the particulate emission tests on gas turbine exhausts was sulfuric acid. Laboratory experiments indicated that substantial quantities of SO₂ can oxidize in the probes of type 347 stainless steel or inconel, but not in quartz probes. Both heated and cold probes were tested. Heating only weakly affected the total sulfur found as sulfate, but increased the amount of iron leached from the stainless steel probes. The results show that SO₂ oxidizes in the metal probes used, and the use of such probes in the field may make emission levels appear to be much higher than they are. 0

22379

APTIC NO. 41605

Fernandez Cellini, R., and L. Gasco

GAS CHROMATOGRAPHY APPLICATIONS IN AIR POLLUTION STUDIES. (Aplicaciones de la cromatografía en fase gaseosa a los estudios sobre contaminación atmosférica). Text in Spanish. Energ. Nucl. (Madrid), 16(75):4-17, Jan.-Feb. 1972. 57 refs.

A review on the utilization of gas chromatography in air pollution studies is presented. Included are applications in suspended particulate, inorganic, and organic pollutant determinations, dissipation studies by means of tracers and photochemical reaction studies, as well as future perspectives in the gas chromatography applications as a basic tool in the field. Gas chromatography is being used in the organic component analysis of suspended particulates, ranging between 0.1 and 10 micron in size. The main compounds determined in this category include aliphatic hydrocarbons, known for their cocarcinogenic action and polycyclic aromatic hydrocarbons, known for their carcinogenic effects, along with nitrogen containing heterocycles. Of the gaseous pollutants, carbon monoxide and carbon dioxide are determined by an automatic procedure which allows the determination of concentrations ranging from 0.01 to 200 ppm in CO. The procedure will sub-

stitute the conventional infrared technique for CO in the near future. Simultaneous determination of sulfur dioxide, hydrogen sulfide, and ethyl and methyl mercaptanes in concentrations as low as 0.002 ppm has been made possible only by gas chromatography utilizing a flame ionization detector. Separation and analysis of atmospheric hydrocarbons which may reach 300 components, some in 0.001 ppm amounts was possible only by means of gas chromatography. Oxygen containing pollutants generated by photochemical reactions from hydrocarbons or nitrogen oxides under intense ultraviolet irradiation and heavy traffic are investigated by gas chromatography. Pollutant dispersion studies utilizing sulfur hexachloride as a tracer allowed to attain best results so far. Studies concerning the reaction mechanisms generating the photochemical smog allowed to establish models correlating the chemical structure of the initial and final reaction products. The future of gas chromatography is viewed in its important role in the investigation of the physical and chemical transformations of the air pollutants.

22380

APTIC NO. 41506

Fujiwara, Masahiro

ANALYSIS AND ESTIMATE OF AIR POLLUTION BY CARBON MONOXIDE. (*Issanka tanso ni yoru taiki osen no kaiseki to hyoka ni tsuite*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan Soc. Air Pollution), 4(1):17, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

In analyzing and evaluating air pollution data, important points are the correlation between pollution concentration and emission sources, between concentration and meteorological factors, between concentration and frequency of high concentration, between measuring time and measurements, and handling of measurement data for less than an hour. In general, the longer the measuring time, the less fluctuation appears in the data. A formula for functional index expressing the relationship between the maximum figure of measurement data obtained during a given period of time and the maximum figure of another period of time has been mathematically obtained. 0

22381

APTIC NO. 41928

Garber, Robert W. and Claude E. Wilson

DETERMINATION OF ATMOSPHERIC SULFUR DIOXIDE BY DIFFERENTIAL PULSE POLAROGRAPHY. *Anal. Chem.*, 44(8):1357-1360, July 1972. 10 refs.

A simple, fast, and sensitive method for the determination of atmospheric sulfur dioxide down to 0.1 ppm SO₂ in air is described. This procedure was applied to samples of air and nitrogen containing SO₂ at low concentrations. The SO₂ is absorbed into solution by bubbling the air sample through dimethyl sulfoxide containing a supporting electrolyte, e.g., lithium chloride, at a concentration of 0.1 M. After deaeration, a differential pulse polarogram is run cathodically on the solution. A peak, between -0.7 and -0.8 V versus the silver-silver chloride reference electrode, results from the electro-reduction of SO₂. The height of the peak is a linear function of the concentration of SO₂ in the solution. This method is free from interference from sulfides and sulfates; however, oxidants such as nitrogen dioxide interfered, probably through oxidation of the SO₂. (Author abstract modified)

22382

APTIC NO. 41539

George, David H. and Matthew Lefkowitz

A NEW CONCEPT: SENSOR EQUIVALENT VISIBILITY. Preprint, American Meteorological Society, Boston, Mass., p. 243-250, 1972. 9 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, Washington, D. C., May 22-26, 1972.)

Attempts to develop an automated, objective visibility measure to be used instead of the traditional prevailing visibility observation are discussed. Conditions for the ideal sensory ob-

servation are discussed along with two functions which relate sensory to objective observations. These two functions, used in the computation of sensor equivalent visibility, are based on the laws of Allard and Koschmieder. The limitations of sensor equivalent visibility are dependence on empirically derived performance characteristics of the human eye, and on time and space averaging of atmospheric parameters. Several studies and experiments that have investigated these limitations are reviewed. Two studies were conducted to develop and test particular schemes for arriving at an operationally useful sensor equivalent visibility. The human estimate of prevailing visibility was compared with sensor equivalent visibility as computed from NRS type transmissometer RVV values. In terms of immediate operational usefulness, the comparisons yielded rather poor results, though for research purposes they indicate that useful results may be developed in the future. Suggestions for improvements to sensor equivalent visibility are numerated and discussed.

22383

APTIC NO. 41968

Grajpel, Andrzej

SPECTROGRAPHIC ANALYSIS OF BLAST FURNACE DUSTS. (*Analiza spektrograficzna pyłow z piecow martenowskich*). Text in Polish. *Chem. Anal. (Warsaw)*, 16(6):1225-1231, 1971. 11 refs.

Blast furnace dusts were spectrographically analyzed to determine contents of iron, zinc, silicon, aluminum, calcium, magnesium, lead, copper, manganese, and chromium. Analysis curves were based on a set of synthetic standards. Both the samples and the standards were fused with potassium pyrosulfate and diluted with graphite powder. Palladium was used as an internal standard. The relative standard deviation of the determinations varied from 0.044% for lead oxide to 0.106% for copper oxide.

22384

APTIC NO. 42109

Grieder, K. and H. Buser

GAS-CHROMATOGRAPHIC DETERMINATION OF CARBON MONOXIDE IN EXPIRED AIR AND IN THE BLOOD. (*Gaschromatographische Bestimmung von Kohlenmonoxid in der Ausatemungsluft im Blut*). Text in German. *Beitr. Tabakforsch.*, 6(1):36-40, July 1971. 11 refs.

The gas chromatographic method described has been developed for the determination of low carbon monoxide concentrations in air and blood. For the determination in expired air, a 4 ml sample is injected in a molecular sieve 13X column, where the CO is separated from the other gases. The CO is then hydrogenated to methane over a nickel catalyst column heated to 290 C, and the methane is determined with a flame ionization detector. The limit of detection is 0.1 ppm CO in a total sample volume of 4 ml. The standard deviation/single determination is 0.04 to 0.08 ppm CO in the CO concentration range of 0.2 to 10 ppm. For the determination in blood, the CO is liberated from the carboxyhemoglobin complex with K₃Fe(CN)₆ transferred into a molecular sieve 5A column which is cooled in liquid nitrogen, and then swept into the gas chromatographic set-up used for the determination of CO in air. In a 0.1 ml blood sample 0.05% HbCO can be detected. The standard deviation/single determination is 0.02% HbCO for a total of 1% HbCO in the blood sample. (Author abstract modified)

22385

APTIC NO. 41628

Grupinski, Leonhard

DETERMINATION OF THE CONCENTRATION OF CHLORINATED HYDROCARBONS IN AIR BY GAS CHROMATOGRAPHY. *Staub. Reinhaltung Luft*, 31(10):397-399, Oct. 1971. 3 refs.

A detailed method is described for determining a large number of chlorinated hydrocarbons by gas chromatography. The description includes the sampling train used, operating

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method, and calibration. The combined appearance of trichloroethane and tetrachloroethane is discussed, and a simple method of checking the efficiency of a series of gas washing bottles is described.

22386

APTIC NO. 41768

Grupinski, L.

GAS CHROMATOGRAPHIC AND REVERSION GAS CHROMATOGRAPHIC DETERMINATION OF ODOROUS COMPONENTS. (*Gaschromatographische und reversionsgaschromatographische Bestimmung von Geruchskomponenten*). Text in German. *Schriftenreihe Ver. Wasser-Boden-Lufthyg.* (Berlin), no. 35:33-34, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Gas chromatography cannot be used for the measurement of all odorous substances but for certain odorous components, such as fatty acids. Reliable gas chromatographic determinations are feasible in flowing systems. Inaccurate results are obtained when a sampling process has to precede the gas chromatographic process. Successful measurements were carried out in the vicinity of refineries, purification plants, and flaying stations. The more recently-developed reversion-gas-chromatography (RGC) operates with much higher qualitative and quantitative sensitivity. Contrary to the isothermal, temperature-controlled gas chromatography, the separating column system is operated with locally and temporally changing temperature. A diluting effect is avoided, since no carrier gas is needed. A mobile oven is passed over a circular or longitudinal column. The oven has a linear temperature gradient with the colder end toward the travel direction of the substance. All components travel, synchronously with the oven to the exit of the column where they are successively passed to the flame ionization detector. The RGC method is presently the only one which permits the direct measurement of odor components.

22387

APTIC NO. 41020

Gutsche, B. and R. Herrmann

SIMPLIFIED FLUORINE-SPECIFIC DETECTOR FOR GAS CHROMATOGRAPHY. (*Vereinfachter fluor-spezifischer Detektor fuer die Gas-Chromatographie*). Text in German. *Z. Anal. Chem.*, 259(2):126-127, April 1972, 3 refs.

A fluorine-specific flame detector described earlier was simplified by using an interference filter for the wavelength 529 nm. The detection limit was improved through this measure on the average by a factor of 1.58. Experiments with chlorine showed that the detection limit could be improved by a factor of four. The operating principle of the detector is based on the enrichment of an argon flow with metallic calcium vapor which is passed to a hot flame together with the gas chromatographic fraction.

22388

APTIC NO. 41063

Gutsche, B., R. Herrmann, and K. Ruediger

A FLUORINE-SPECIFIC DETECTOR FOR GAS CHROMATOGRAPHY. (*Ein fluor-spezifischer Detektor fuer die Gas-Chromatographie*). Text in German. *Z. Anal. Chem.*, 258(4):273-277, 1972, 7 refs.

A detector is described in which a stream of metallic calcium in argon is brought into a small acetylene-oxygen flame. If fluorine compounds are added, calcium fluoride bands are observed in the flame. These can be employed for qualitative and quantitative analysis of fluorine in gas chromatographic fractions. The standard deviation was plus or minus 2.7% for flame spectrometric indication and plus or minus 2% for gas chromatographic indication. Possibilities for further development of this method are discussed.

22389

APTIC NO. 41642

Halstead, C. J., G. H. Nation, and L. Turner

THE DETERMINATION OF NITRIC OXIDE AND NITROGEN DIOXIDE IN FLUE GASES. PART II. CONTINUOUS INSTRUMENTAL METHODS. *Analyst*, 97(1150):64-69, Jan. 1972, 8 refs.

Non-dispersive infrared spectrometry and coulometry are both applicable to the continuous monitoring of nitric oxide and nitrogen dioxide in flue gases. Spectrometric gas analysers are commercially available that can easily be modified to operate in the range 0 to 200 ppm nitric oxide with a lower limit of 5 ppm. Water vapor interference can be eliminated with either a calcium sulfate or solid carbon dioxide trap. Nitrogen dioxide can be continuously monitored coulometrically using a platinum electrode-buffered iodide system. The sensitivity is affected by water vapor, nitric oxide, and iodide concentrations.

22390

APTIC NO. 41505

Hamaguchi, A. and K. Ito

AN IMPROVED MEASURING DEVICE OF SULFUR DIOXIDE IN THE ATMOSPHERE BY THE LEAD DIOXIDE METHOD. (*Nisankaen ni yori taikichu to sankabutsu no kairyo sokuteiho*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan Soc. Air Pollution), 4(1):20, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

In this new measurement method for sulfur dioxide, meteorological factors such as wind direction and wind velocity have no influence. A small amount of traganth liquid is mixed with the lead dioxide powder, and larger particles are formed and dried. A test tube is packed with this material and the air is passed through for a month; the weight of lead sulfide is measured by the usual method and the concentration of sulfur dioxide is measured cumulatively. The collection rate was tested by measuring the air at the entrance and exit by para rosanilin; it was 70 to 80%. When a humidifier was installed in the tube, the collection rate was improved to 100%. For a good result, a certain amount of moisture seemed necessary. However, in a measuring atmosphere, the average 30% humidity should be sufficient. After one month of the test period, a 3% deterioration in the collection rate was recognized. When the lead oxide was divided into three segments after 100 cu m of atmosphere was passed through the test tube, it was discovered that the first 1/3 had absorbed most of SO₂. When the air is continuously absorbed for 1 month or more, the air flow is gradually impaired because of the dust accumulation in the tube. Therefore, it will be necessary to install a filter in front of the tube. By this, measuring of suspended particulates, sulfuric acid mist, and other sulfides will become possible.

22391

APTIC NO. 41531

Hochreiter, Frederick C.

THE PRESENT AND FUTURE OF VISIBILITY OBSERVATIONS. Preprint. American Meteorological Society, Boston, Mass., p. 236-242, 1972, 5 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, Washington, D. C., May 22-26, 1972.)

Most visibility observations taken today are subjective estimates made by humans. Due to the degree of subjectivity, it is impossible to conduct an error analysis of sensory observations. Abstract variables, such as the familiarity of the observer with the terrain and markers, background illumination, contrasts, and the intensity of nighttime markers do not permit an analysis that will produce any meaningful results. Because the observations depend primarily on the subjective nature of the human eye, there is little hope of much improvement. Alternate means for obtaining visibility information must be considered. An objective measurement by an instrument should be a suitable substitute. Instruments that measure scatter or ex-

inction coefficient are discussed. Tests conducted to evaluate several sensors are discussed along with considerations for future visibility observations. Light scattering instruments, and a transmissometer are discussed.

22392

APTIC NO. 40976

Hoshika, Yasuyuki

SOME PROPOSAL ON INVESTIGATION METHODS FOR ODOR POLLUTION (PART II). (*Akushu kogai chosano ni kansuru teian (sono 2)*). Text in Japanese. *Akushu no Kenkyu (Odor Research J. Japan)*, 1(5):33-40, Aug. 1971.

Methods of investigating bad odor pollution are discussed. The panel method is briefly mentioned and the questionnaire method is discussed in full. The area to be investigated is divided into eight to 10 segments, and 30 to 40 houses in each segment (four or five houses apart) are to be visited by a team of two investigators. Evening hours when all the members of families are present are more desirable. Each visit is to last from five to 10 min. The questions include the following points: the presence of odor and the degree of odor, the degree on the particular day of visit, recent tendencies in comparison to previous years, who among the family complains most, when the odor first started, what season seems to bring out odor most, in what weather the odor seems worst, what the odor smells like, what effect the odor has on the questioner's life, whether the odor seems to have any effect on the family health, whether the questioner feels this is part of public nuisance, and what the questioner can suggest as a solution. An example of investigation made in the vicinity of a doll manufacturing and painting factory is reported. Tests were made by a review of previous complaints, an olfactory test panel, gas chromatography test, and questionnaires. The gas chromatography test showed 0.03 ppm to 7.2 ppm of acetic acid methyl, acetic acid ethyl, acetic acid n-butyl ester, benzene, toluene, and ethyl benzene. Toluene and acetic acid n-butyl concentration exceeded the threshold figures.

22393

APTIC NO. 41751

Howell, R. R. and L. R. Hunt

METHANE-AIR COMBUSTION GASES AS AN AERODYNAMIC TEST MEDIUM. *J. Spacecr. Rockets*, 9(1):7-12, Jan. 1972. 31 refs.

The experimental study of certain hypersonic aircraft and boost vehicle problems requires large hypersonic test streams having realistic energy levels. The major problems associated with the use of hydrocarbon-air combustion gases as an aerodynamic test medium are reviewed. Condensation of water vapor is identified as the major problem, and actual experience is offered as evidence of its effects on aerodynamic flow parameters. However, dynamic pressure, the principal flow parameter at hypersonic speeds, is changed only slightly by condensation. Aerodynamic data obtained from tests in methane-air combustion gases are compared with theory and with data obtained on the same shapes in other test facilities using other test media. (Author abstract modified)

22394

APTIC NO. 41082

Imagami, Kazunari

THE PRESENT CONDITION OF AIR POLLUTION MEASUREMENT TECHNIQUES. (*Taiki osen no sokutei gijutsu no genkyo*). Text in Japanese. *Oyo Butsuri (Tokyo)*, 40(11):1242-1252, Nov. 1971. 34 refs.

Air pollutants, emission sources, various measurement methods, and instruments are reviewed. The pollutants discussed are dust, settling particulates, suspended particulates, sulfur oxides, nitrogen oxides, carbon monoxide, oxidant, and hydrocarbons. Instruments discussed include: dust tube, cylindrical filter paper holder, deposit gauge, dust jar, hi-volume air sampler, tape air sampler, digital dust counter, cascade impactor, infrared gas analyzer, oxidant absorption

photometry, flame ionization detector, potentiometric method, and the telemeter system for monitoring. According to the survey of monitoring stations conducted by the Ministry of Health and Welfare, a total of 225 stations are monitoring air pollution in Japan; 27 stations have computer data handling systems; 191 stations use telemeter systems; 109 stations use SO₂ dust meters; 121 stations use automatic continuous sulfur dioxide meters; and 78 stations are using automatic dust counters. Anemometers are used at 190 stations; temperature is monitored at 39 stations.

22395

APTIC NO. 42020

Ishii, Takeshi

POLAROGRAPHIC ANALYSIS OF AIR POLLUTANTS - (1) ANALYSIS OF INORGANIC MATERIALS.

(*Polarografu ho o mochiuru taiki osen bunseki - Sono 1*) *Muki seibun no bunseki*. Text in Japanese. *Kogai to Taisaku (J. Pollution Control)*, 8(6):565-572, June 1972. 61 refs.

A general discussion on the analyses of inorganic substances in air by polarography is presented. The characteristic of the polarogram of sulfur was that it showed easily detectable reduction curves which had rapid declination at right sight of its two unsymmetrical waves. The AC polarogram and oscillo polarogram of lead and copper in exhaust gas at four engine conditions of idling, acceleration, constant speed, and deceleration are given. Organic manganese compound was decomposed by a bromine-carbon tetrachloride solution, and the basic solution for AC polarography was prepared by using triethanolamine and potassium hydroxide. The polarographic determination of copper, lead, cadmium, iron, and zinc content in air could also be performed simultaneously. The quantitative determinations of Cu, Pb, and Cd were carried out at 0.20, -0.47, -0.65 V versus Hg-pool respectively. Cobalt of 0.08% concentration could be detected with 3% accuracy. Detections of ions such as nitrate, sulfite, iodate, and bromate were also briefly described.

22396

APTIC NO. 40998

Johari, Om and Phillip B. DeNee

HANDLING, MOUNTING AND EXAMINATION OF PARTICLES FOR SCANNING ELECTRON MICROSCOPY. *Scanning Electron Microsc.*, vol. 5:249-256, April 1972. 19 refs. (Presented at the IIT Research Institute, Scanning Electron Microscope Symposium, Annual, 5th, Chicago, Ill., April 1972.)

A summary of the common techniques now used in scanning electron microscopy was compiled. Though particles are complex substances, they can be routinely handled in the SEM to provide considerable additional information not readily available by other techniques. Conventional statistical sample splitting techniques used for larger particles apply to small particles also. Many choices of mounting substrates and adhesive media are available, and selection must take into account the size and chemistry of the particle. Although rapid developments in obtaining crystallographic information from the SEM are being made, no results on particles have yet been reported.

22397

APTIC NO. 41618

Julian, A.

VARIOUS VERTICAL SAMPLING DEVICES FOR AEROSOLS. (*Etude des différents dispositifs de prélèvement en altitude des aerosols*). Toulouse Univ. (France), Thesis (Ph.D.), 1970, 86p., 33 refs. Translated from French by Translation Consultants, Inc., Arlington, Va., 61p., Jan. 1972.

NTIS: N72-15571

The vertical distribution in the atmosphere of the long-lived radioactive elements (⁷Be, ³²P, ⁹⁰Sr, ²¹⁰Pb, and ²¹⁰Po) and the stable elements (Na, Br, Fe, P, Mn, and Cl) was studied with a particular emphasis on the suitability of several dif-

ferent sampling devices and the atmospheric physics problems involved with them. Several commercial filters were studied from the point of view of effectiveness, loss of pressure-head, and content of impurities. For collection of radioactive aerosols, the dynamic sensor performed better than other devices due to the great flow rates which it allows. For stable aerosols, the combined system (dynamic sensor-turbine) gives the best performance, although the dynamic sensor is likewise advantageous for aircraft speeds better than 80 m/sec. The design and performance of the experimental MACRO and MACROJUDO apparatus for collection of radioactive particles is also described.

22398

APTIC NO. 41495

Kainz, G.

MODERN METHODS OF GAS ANALYSIS. *Oesterr. Chemiker Zeit.* 39(3/4): 45-51, Feb. 1968. 12 refs. Translated from German. British Iron and Steel Industry Translation Service, London (England), 17p., Aug. 1970.

Several important physical measuring and separation processes in gas analysis which have contributed to extensive automation in this field of analysis are discussed. Methods based on magnetic susceptibility where the gas sample is introduced into a homogeneous or nonhomogeneous magnetic field are useful for distinguishing paramagnetic and diamagnetic gases and identifying gases by their magnetic permeabilities. Measurement of the paramagnetic susceptibility is mainly used for determining oxygen concentrations, providing no other paramagnetic gases are present. Methods employing thermal conductivity (i.e., the number of calories which in the presence of a gas pass between two plates 1 sq cm in size, 1 cm apart, with a temperature difference of 1°C) are primarily applicable to binary gas mixtures such as hydrogen or nitrogen. Such methods may be used for determination of carbon dioxide in flue gas and for indirect determination of carbon monoxide. Mass spectrometer methods, where positively charged gaseous ions are separated by a magnetic field according to their specific mass, are very useful for determination of the lower hydrocarbons and for analysis of natural gas and cracked gases. Optical methods, based on the principle that the component to be determined is absorbed in the ultraviolet or infrared range of the spectrum, are frequently used for the trace analysis of gases and much more frequently for the analysis of vapors such as those from mercury and organic solvents. Infrared absorption methods find considerably wider application for trace analysis than do ultraviolet, since they are more specific. Since the above mentioned conditions for direct physical gas analysis cannot always be met, physical methods of separation are also discussed. Of these, absorption and desorption analyses represent a considerable advance. Several types of chromatographic methods are described in detail along with the procedures and evaluative aspects of chromatograms. Of special significance are chromatographic methods employing thermal conductivity cells which, after suitable electronic amplification, can be coupled direct to a recorder device.

22399

APTIC NO. 42018

Kaller, R. S.

PROCESSING OF DATA AT CONTINUOUSLY RECORDING SYSTEMS FOR POLLUTANT ANALYSIS. (*Messwertverarbeitung bei kontinuierlich registrierenden Systemen zur Schadstoffanalyse*) Text in German. Preprint, Frankfurt Univ. (West Germany), Inst. for Meteorology and Geophysics, 8p., 1972.

Since Dec. 1966, emission measurements have been carried out in Frankfurt at the emission measurement station of the Federal Ministry of the Interior. This measurement station is connected with seven sub-stations located in Frankfurt. One of these stations is directly in the center of Frankfurt, two are in the East and West of the city, four other stations are in the suburbs of Hattersheim, Neu Isenburg, Grosskrotzenburg, and

Niedererlenbach. The central station takes measurements of meteorological parameters such as wind direction, wind speed, temperature, humidity, radiation, and pressure. The entire measurement grid comprises seven sulfur dioxide, three carbon monoxide, and three carbon dioxide measuring stations and one measuring station for each of the following substances: dust, hydrocarbons, and oxides of nitrogen. Measured data are transmitted from the sub-station to the central station where a real-time computer is used for digital recording of data, data processing, and calibration of the measuring equipment.

22400

APTIC NO. 41986

Kato, Tatsuo

APPLICATION OF GAS CHROMATOGRAPHIC METHOD TO THE CO ANALYSIS IN THE ATMOSPHERE. (*Kankyo Issankatanso no Gasukromatogurafu-ho ni yoru chosa*). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 10(4):197-205, Aug. 1971.

Infrared spectrometry is usually used to measure carbon monoxide in the atmosphere. But, this method cannot always suit the complexity of urban air pollution. Gas chromatography was applied to the investigation of CO pollution derived from auto exhaust. The analysis is based on the technique of CO reduction by a nickel catalyst to methane, which was detected by means of a flame ionization detector. In sampling, thousands of plastic medical syringes were used and these 2 ml of air samples were analyzed. The analytical limit was 0.1 ppm. At the field investigation, 1500 samples were treated. The results are discussed. This method can be used for measurements at small expense.

22401

APTIC NO. 42298

Keefer, Richard D. and John S. Wyman, Jr

GAS SAMPLING DEVICE. (Bendix Corp., Detroit, Mich.) U. S. Pat. 3,654,801, 7p., April 11, 1972. 19 refs. (Appl. Feb. 14, 1969, 8 claims).

A gas sampling device is described which comprises a sampling head with supply and take-up reels mounted on opposite sides of the head to accommodate filter material in tape form. The sampling head has two blocks which are urged toward each other to clamp a portion of the filter tape between the blocks. Each block is formed with a gas chamber which is positioned so that a sample of gas can be passed through the filter tape between the blocks. A spool with cam surfaces having serrated teeth is connected to one of the blocks and positioned so that when the spool is rotated the cam surfaces momentarily shift one of the blocks away from the other block and advance the filter tape through the head. The supply reel is connected to a drag clutch and the take-up reel is driven through a friction clutch so that the tape is always under a slight tension. In previous devices it was a problem to properly load and align the tape in the sampler and to provide a means for positively and uniformly feeding the filter tape through the sampler. (Author abstract modified.)

22402

APTIC NO. 42137

Kern, Zarka, Denimir Kerin, and Dusan Djuric

LEAD CONTAMINATION OF ENVIRONMENT IN MEZA VALLEY LEAD CONTENT OF THE SOIL. *Int. Arch. Arbeitsmed.*, 29(2):129-138, June 1972. 7 refs.

Since 1966 the lead smelting plant in Meza valley, Slovenia, Yugoslavia, has contaminated the environment with lead aerosols. Since 1968 a broad ecological and epidemiological study on environmental contamination and human exposure has been conducted. Determinations of lead in the soil represent a major part of these investigations. On 33 sampling spots along the valley the soil and plant samples were taken every year in July and October. The results of the total lead content of the soil for 1968 and 1969 are presented, together with data about quantitative distribution in the valley. How-

ever, investigations on adsorption coefficient (soil: plant) revealed that the total lead content does not represent a reliable parameter for such calculations. Therefore, determinations of lead in the acetate: lactate extract of the soil were made. This parameter is showing, in some cases, a better correlation between lead in soil and underground parts of plants. It seems that determination of AL-soluble lead from the soil represents a step forward in the determination of the absorbable part of the lead. (Author abstract modified)

22403

APTIC NO. 41764

Kettner, H.

THE PROBLEM OF ODOROUS SUBSTANCES. *Problematik geruchsbelästigender Stoffe. Text in German. Schriftenreihe Ver. Wasser-Boden-Luft Hyg. (Berlin), no. 35:7-8, 1971. (Presented at the Colloquium Geruchsbelästigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)*

Odors come from industrial or agricultural processes such as domestic refuse. They are usually composed of a number of components. A definition of odorous substances should include the waste air from chocolate factories, bakeries, and breweries. Odors can be measured subjectively (smelling) or objectively (by physical-chemical methods). The first method poses problems because of the great difference of odor sensitivity; the second method poses problems when the odor stems from a number of volatile substances. In such cases, a leading component must be determined such as the fatty acids in animal skinning stations, amines in the fish canning industry, and mercaptans in oil refineries.

22404

APTIC NO. 41644

Khalyapin, S. A. and A. E. Mironov

RADIOMETRIC DETERMINATION OF SULPHUR IN GASES. *Coke Chem. (USSR) (English translation from Russian of: Koks i Khim.), no. 10:52-54, 1971. 4 refs.*

A radiometric method for the determination and in-process control of sulfur in streams of gases generated by coke and chemical plants is described. The radiometry principle is based on the relationship between soft gamma-ray absorption and the atomic number of the absorbing element. The on-stream gas analyzer for sulfur determinations is based on the use of a compensating source and beam amplitude modulation. Radiation from two sources passes through the working and comparison channels in the analyzer. The working channel includes an on-stream gas cell, while the comparison channel includes a compensating slide. The rotating shutter alternately exposes the single detector, which consists of a scintillation counter and a photoelectric multiplier, to the two beams. When the beam intensities in the working and comparison channels are different, the alternation produced by the shutter leads to an alternating current signal at the output of the system controlling a reversible motor. The amplitude of the signal driving the meter is proportional to the sulfur content of the gas to be analyzed. A prototype analyzer was tested at a coke and chemical works and the instrument readings were evaluated by comparing them with the results of simultaneous chemical analyses on the sample gas. A t-test was applied to confirm that there was no systematic difference between the two sets of results. The trial results obtained with the prototype analyzer were fully in accordance with the theoretical principles on which the procedure was based.

22405

APTIC NO. 41994

Klainer, Stanley M., E. Robert Schildkraut, Harvey Fannenbaum, and David Tanenbaum

CONSIDERATIONS IN REMOTE RAMAN SPECTROSCOPY. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet., Edgewood Arsenal, Md., 1971, p. 106-122. (March 24-25.)*

NTIS, DDC: AD 729929

The purpose of the Raman spectrometer is to determine the frequency and intensity of the light scattered by a molecule in the atmosphere. From this information it is possible to identify the scattering material and its quantity. The displacement is independent of the incident frequency and is measured in absolute units or wavenumbers and this value is called the Raman shift. In remote Raman spectroscopy, the source light is a pulsed ruby laser and the scattering is observed through a telescopic system. The return information yields the Raman shift, Raman cross section, and Raman line widths. The shift is the displacement of the spectrum, the cross section is the shape of the wave and a measure of the efficiency of the molecular response, and the line width is given by the minimum and maximum frequencies for a given spectral line. At the present time, sensitivity is best in the ultraviolet and is collected through a 36 in cassegrain telescope. Raman displacements are known for a variety of atmospheric species including major pollutants and organic phosphates. There is sufficient spectral separation for specific detection of ozone, sulfur dioxide, nitrogen oxides, ammonia, tributyl phosphate, triethyl phosphate, and trioctyl phosphate. This system is destined to be, with laser improvements, the most important analytical technique in the next ten years for remote detection of atmospheric pollutants.

22406

APTIC NO. 41277

Kochnev, K. V. and A. S. Shadrin

SPECTROPHOTOMETRIC METHODS OF DETERMINING THE ACROLEIN CONTENT IN AUTOMOBILE ENGINE EXHAUST GASES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhopnyimi Gazami Avtomob., Proc. Symp., 2nd, 1971. 4 refs. Translated from Russian. 9p.*

Several analytical methods for determining the content of acrolein in automotive exhaust gas were developed by using an artificial gas mix (acrolein and air), followed by using the exhaust gases from gasoline and diesel engines. A comparative analysis was made of samples of the gas mix investigated simultaneously by the fuchsin sulfurous acid method and by spectrophotometric procedures using 4-hexyl resorcinol and thiosemicarbazide. The 4-hexyl resorcinol method is recommended as the most specific, while the thiosemicarbazide method can be used to arrive at an overall determination of the unsaturated aldehydes (of acrolein and its derivatives).

22407

APTIC NO. 41047

Kokubo, Ichiro

STUDIES ON THE TOTAL HYDROGEN CONCENTRATION SIMPLE MEASUREMENT DEVICE FOR AUTOMOTIVE EXHAUST GAS. *Uidosha haiki gasu-chu no zen tankasuiso nodo kani gata sokutei sochi ni kansuru kenkyu. Text in Japanese. Unyusho Kagaku Gijutsu Shiken Kenkyu Hojokin ni Yoru Shiken Kenkyu Seikashu (Prog. Rep. Pilot Res. Minist. Transport. Sci. Technol. Test Res. Subsid.), no. 17:117-120, Aug. 1971.*

A simple measurement device for total hydrocarbon concentration in automotive exhaust gas was constructed by combining an automatic air mixer with a hydrogen flame ionization detector. The air and gas ratio remained constant in order to minimize the error of measurement. The change of measurement values was 4% for a 40% change of measurement flow rate at the range of 4 to 2.5 l/min. Oxygen which has an ionization potential of 14.4 eV shows a special effect on the ionization detector. As the concentration of oxygen increases, the measurement error increases as well. The oxygen effect on this equipment was about the same as that on the commercial equipment. Other characteristics of this device, such as sensitivity, stability, noise level, and linearity were at about the same level as those of a commercial equipment.

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22413

22408

APTIC NO. 42139

Kometani, Thomas Y., John L. Bove, Benjamin Nathanson, Stanley Siebenberg, and Martha Magyar

DRY ASHING OF AIRBORNE PARTICULATE MATTER ON PAPER AND GLASS FIBER FILTERS FOR TRACE METAL ANALYSIS BY ATOMIC ABSORPTION SPECTROMETRY. *Environ. Sci. Technol.* 6(7):617-620, July 1972. 12 refs.

Particulate air pollutants collected on paper filters can be dry ashed at 500 C without serious loss of trace metals by volatilization. Conversion of metal salts to sulfates by the addition of sulfuric acid prior to dry ashing ensures virtually complete recovery of the metals tested. Losses reported during dry ashing of particulate matter collected on glass fiber filters are not necessarily ascribable to volatilization as has commonly been supposed. Metals such as lead, zinc, copper, and cadmium react to varying extents with glass at high temperatures to form insoluble metal silicates. Comparative studies of particulate matter collected on paper filters in New York City indicate that the results obtained by dry ashing compare favorably with those of accepted methods such as wet ashing and low-temperature ashing. Good recoveries of Pb, Cu, Zn, and Cd from New York City samples were obtained by dry ashing at 500 C for one hour, even without the prior use of H₂SO₄.

22409

APTIC NO. 41903

Konosu, Hisao, Yo-ichiro Mashiko, and Masato Sato

DESIGN OF A NONDISPERSIVE VACUUM ULTRAVIOLET PHOTOMETER AND ITS APPLICATION TO TECHNICAL GAS ANALYSIS. (*Hibunsangata shinku shigai kodokeri no shisaku to kogyo gasu bunseki e no oyoi*). Text in Japanese. *Nippon Kagaku Kaishi (J. Chem. Soc. Japan)*, no. 1:47-53, Jan. 1972. 21 refs.

A nondispersive vacuum ultraviolet photometer was developed for continuously recording the concentration of two component gaseous or liquid systems. It is essentially a single-beam instrument using the nondispersion principle. The photometer measures the relative intensities in the wavelength range of 1650-2000 Å between the reference gas (nitrogen or air) and the sample gas. The main apparatus consists of a deuterium discharge tube, a gas cell of 200 mm length with quartz windows, a photomultiplier, and a vacuum system. In the detection system a sodium salicylate plate is employed, and then the photocurrent at the detector is amplified and recorded. The ultraviolet light from the source is cut off by a fixed grating and an exit slit. A precision comparable to that of other methods and limits of detection of less than 1 ppm for benzene and toluene, less than 10 ppm for nitrogen dioxide, nitric oxide, ethylene, and propylene; 18 ppm for acetylene; 57 ppm for oxygen; 830 ppm for propane; and 920 ppm for carbon dioxide were obtained. The method may be applied to the continuous analysis of chemical processes and toxic gases in the atmosphere.

22410

APTIC NO. 41964

Kotrappa, P. and C. I. Wilkenson

MEASUREMENT OF THE SPECIFIC RADIOACTIVITY WITH RESPECT TO PARTICLE SIZE FOR LABELED AEROSOLS. *Aerosol Sci.* 3(3):167-171, 1972. 9 refs.

The relationship between labeled radioactivity and particle size is an important characteristic of a labeled aerosol. Measurements were made of the specific activity of labeled fused clay aerosols by dividing the aerosol into several narrow size groups using the Lovelace Aerosol Particle Separator (a spinning spiral spectrometer similar to that of Stober), determining the radioactivity per particle by counting the number of particles and the radioactivity associated with a known area, determining the relationship between relative radioactivity per particle and particle size, and dividing the function thus obtained by the cube of the particle diameter. Fused clay

aerosols labeled with yttrium 91, strontium 90-yttrium, cerium 4,4-praseodymium and cesium 137-barium had the relative radioactivity proportional to the cube of the particle size, thus demonstrating that the specific activity is independent of particle size. Fused clay aerosol labeled with ruthenium 106-rhodium had a relationship other than cubic, demonstrating particle size dependence of specific activity probably because of the volatility of Ru under heat treatment. Adaptation of this method as a general method for characterizing labeled aerosols is discussed.

22411

APTIC NO. 41192

Kurchatova, G.

BERYLLIUM AND ITS DETERMINATION. (*Za beriliya i opredelyaneto mu*). *Khigi. Zdraveopazvane*, no. 14:303-307, 1971. 68 refs. Translated from Bulgarian. 12p.

Beryllium is widely used as an alloy with other metals, particularly aluminum and copper. Its slow atomic weight, high neutron dispersal coefficient, and resistance to radiation and high temperatures permit its use as a retardant and a reflector of delayed neutrons. Metallic Be and all its alloys have a rather high toxicity and can cause acute and chronic sickness. The toxicity depends greatly on the dispersion of the Be particles. Beryllium and its compounds cause conjunctivitis, contact dermatitis, and have a carcinogenic effect. Beryllium is found in atmospheric air when coal and petroleum containing Be compounds are burned or as exhaust from industrial enterprises. Serious pollution from Be oxide occurs during the cleaning of electric filters by plants using coal dust with a high Be content. Methods of determining Be are reviewed, including spectrographic methods, fluorometric methods with molybdenum, and chromatographic, polarographic, and colorimetric methods.

22412

APTIC NO. 41216

Kurov, B. A., V. F. Kutenev, and I. V. Ignatovich

EVALUATION OF THE TOXIC SUBSTANCES CONTAINED IN THE EXHAUST GASES FROM AUTOMOBILE CARBURETOR ENGINES. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic. Snuzheniye Zagaz. Vozdukh Gorodakh Vykhopnyim Gazam Avtomob.* Proc. Symp., 2nd, 1971. Translated from Russian. 11p.

United Nations Economic Commission for Europe Regulation No. 15 establishes three types of tests for use with new mass-produced car models. Type I tests establish the quantity of carbon monoxide and hydrocarbons emitted in exhaust gases during the driving cycle simulating heavy city traffic after a cold engine start. Type II tests monitor the concentration of CO in the exhaust gases at idling speed. Type III tests monitor crankcase emissions of hydrocarbons at idling speed and when the vehicle is moving at 50 km/hr. Among the requirements which make the tests difficult are that the vehicle be kept at a temperature of between 20 and 30 C for 6 hr prior to the test and that the toxicity of the gasoline be evaluated. An expensive test stand with running rollers and changeable flywheel is required. The results of the tests permit the selection of optimum adjustment, show what effect engine and parts design have on toxicity, and make a comparative evaluation of control devices. The ECE test methods are evaluated on the basis of tests conducted on 12 different model vehicles using the ECE cycle. Universal characteristic curves, constructed for load characteristics, provide a graphic comparison of engines in terms of toxicity.

22413

APTIC NO. 41101

Lanconia, J. A. and H. N. Treagus

THE EFFECT OF PULSATION DAMPING ON RESPIRABLE DUST COLLECTED BY COAL MINE DUST PERSONAL SAMPLERS. *Bureau of Mines, Pittsburgh, Pa. Pittsburgh Field Health Group. Rept. 636* 23p. 1972. 6 refs.

Two types of approved coal mine dust personal samplers were examined to determine the effect of decreasing the amplitude of anflow velocity on cyclone performance. More dust was collected when pulsation free flow was used. Velocity fluctuations were reduced by means of a pulsation damper. Damper efficiency of about 85% was needed to reduce the fluctuations to an acceptable level. The data were obtained using both pulsating and nonpulsating flow. Masses of respirable coal dust as determined by weighing and of the particle size distributions as determined by an electronic counter were compared. There is an empirical relationship between the ratio of the masses collected using pulsating and nonpulsating flow and the ratio of the maximum air velocity to the minimum air velocity as measured in the cyclone entrance channel. Therefore, cyclones should be equipped with snubbers of 85% efficiency or greater or of sufficient efficiency to lower the ratio of maximum air velocity to minimum air velocity to about 1.2 or less. (Author abstract modified)

22414

APTIC NO. 41908

Lander, D. W., L. Steiner, D. H. Anderson, and R. L. Dehm

SPECTROGRAPHIC DETERMINATION OF ELEMENTS IN AIRBORNE DIRT. *Appl. Spectry.*, 25(2):270-275, 1971, 2 refs

An emission spectrographic method is described to determine the concentrations of aluminum, cadmium, calcium, chromium, copper, iron, lead, magnesium, nickel, silicon, tin, and zinc in airborne dirt. A measured volume of air is drawn through a 1-inch filter paper. The filter is analyzed by a direct reading emission spectrophotometer using a push-up technique to introduce the sample into the analytical gap. Calculations and report writing are performed by a computer. Computer programs and the data interpretation by annotating the results and by the preparation of summaries and graphs. The precision is approximately plus or minus 25% of the amount present at the 3-microgram level. Analysis time is about 5 min/sample. (Author abstract)

22415

APTIC NO. 42006

Landis, Philipp

SMOKE DENSITY MEASUREMENT AS A CONTRIBUTION TO ENVIRONMENTAL PROTECTION. (*Rauchlichtmessung als Beitrag zum Umweltschutz*). Text in German. *Chem. Rundschau (Solothurn)*, 25(9):219, March 1972

Problems of smoke density measurements are described with special regard to photoelectric methods. As the soot and fly ash produced by incomplete combustion, can hardly be determined by means of gas analytical procedures, the density and the quantity of the smoke should be measured. Continuous dust concentration measurements in waste gases are required. While photoelectric smoke density measuring instruments are unable to deliver direct readings in dust weight/cu m, light absorption measurements give reproducible values. The total cross section is covered by the light beam and the Lambert-Beer law is valid. The extinction constant depends on the shape, optical properties, and grain size of the particles, the wave length of the light applied, as well as of the dust concentration. Provided the above magnitudes are constant, the extinction constant is proportional to the dust concentration. However, both the size and the optical properties of the particles vary within the same equipment. Photoelectric smoke density measuring instruments should provide good reproducibility and highly homogeneous light beam. The optical parts should be kept clean by means of air flow.

22416

APTIC NO. 41496

Langen, Lee

REMOTE SENSING MEASUREMENTS OF REGIONAL GASPHOUS POLLUTION. Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection

Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, 10p., 1971, 2 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1060.)

The applications of remote measurement of key air pollutants as constituents of the vertical air column are discussed using field data. The correlation spectrometer bridges the gap between source studies and ambient air monitoring. Combined with ground-level data, burden or flow data can be used to trace contamination to its source. Individual stacks can be singled out as contributors. Measurements of sulfur dioxide and nitrogen dioxide were made with prototype and production models of the Barringer Research Correlation Spectrometer. Maps of total burdens and mass flow in Missouri-Illinois and California are used as illustration of regional movement of pollutants and as a method of measuring emissions by remote means. (Author abstract modified)

22417

APTIC NO. 42102

Leichnitz, Kurt

SAFETY CONTROL THROUGH AIR ANALYSIS. (*Unfallschutz durch Luftanalysen*). Text in German. *Chem. Tech. (Berlin)*, 1(5):211-213, 1972.

Air quality testing in workrooms of industrial plants is being widely practiced in West Germany by conventional analytical methods or where feasible, with test cartridges as a safety precaution and as a psychological tool. Air quality testing has proven inexpensive when compared with accident compensation. In setting up a safety control plan the physical, chemical, and physiological properties of the pollutant, its flash point, the quantity of the polluting substance being used, processed, transported, or stored, and the choice of suitable test cartridge type, the location of measuring instrument, test frequency, and the checking of the proper functioning of the instrument before measurements are made must be considered. Test protocols must be kept, indicating name of plant, site of measurement, day and hour of measurement, temperature, weather, type of ventilation of the work room, humidity, carbon dioxide content (cartridges), result of analysis, and observations. If the test result exceeds the permissible level, measures necessary for the protection of the work force must immediately be put into effect (ventilation, exhaust hoods, leakage reduction, process modification, and face masks).

22418

APTIC NO. 41492

Levaggi, D. A. and M. Feldstein

DETERMINATION OF PHENOLS AND TRIMETHYLAMINE IN INDUSTRIAL EFFLUENTS. Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration, and National Oceanic and Atmospheric Administration, 2p., 1971, 4 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1060.)

Gas chromatography is a necessary mode of analysis for specific identification of trimethylamine and phenol. Phenol emissions are regulated because of their photochemical reactivity and low odor threshold. Trimethylamine has an odor threshold of 0.2 ppb. Phenols are collected in an alkaline solution. The sample is acidified and injected into a gas chromatograph with a flame ionization detector. Trimethylamine is collected in an acid solution, alkalinized, and injected into a gas chromatograph. Abatement devices for both species are effective.

22419

Ludosan, Eugenia and Carmen Pop

TUBES DETECTING CARBON MONOXIDE IN THE ATMOSPHERE. (*Tuburi detectoare de oxid de carbon in atmosfera*). Text in Rumanian. *Rev. Chim. (Bucharest)*, 23(3):175-177, March 1972. 16 refs.

Procedures for the determination of carbon monoxide in air samples by means of detector tubes were studied. The specific reagents applied included palladium chloride, ammonium molybdate, and iodine penta-oxide. Two procedures were the most suitable for the semi-quantitative evaluation of carbon monoxide in the air, one utilizing granular silica gel of 0.25 to 0.31 mm particle diameter size impregnated with a 0.5% solution of Pd Cl₂ heated to 80 C until the silica gel assumes a yellow-orange color. The presence of CO is determined by the black color developed following generation of reduced metallic palladium. The other procedure utilized silica gel of the same granularity treated with a sulfuric acid solution containing 60% free sulfur trioxide and one gram of I₂O₅ per 100 cu cm. The presence of CO is indicated by the yellowish-brown color developed from the molecular iodine generated following reduction of its penta-oxide. The treated silica gel is introduced into calibrated glass tubes having 6.0 to 10.0 mm diameters and 60 to 120 mm lengths allowing direct reading of the amount of CO contained in the air sample. To prevent interference from hydrogen, carbon dioxide, nitrogen, nitric oxide, hydrogen sulfide, formaldehyde, methane and sulfur dioxide, filtering layers including coarse silica gel treated with mercury sulfate dissolved in concentrated sulfuric acid are applied. Fiber glass is used at the inlet, outlet, and as a separating layer between the filtering and reacting silica gel systems. Included is a sketch of such a detector tube. Both procedures allow the evaluation of CO amounts starting from 0.0024% volumetric concentrations in the air with a 25% error range.

22420

Lux, H. and H.-G. Daessler

METHODOLOGICAL STUDIES OF THE LIESEGANG METHOD UNDER KNOWN SO₂ CONCENTRATION APPLIED CONDITIONS. (*Methodische Untersuchungen zum Liesegang-Verfahren, bei Begasung mit definierten SO₂-Konzentrationen*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(2):81-87, Feb. 1972. 22 refs.

Various factors influencing the time-related sulfur values obtained by means of the Liesegang method were studied under known sulfur dioxide concentrations. Experiments with different SO₂ concentrations and equal exposure times revealed the concentration dependence of the sulfur values. Sulfur values increased with rising concentrations which caused increased dispersion of the values with practically the same variability coefficients. The time-related sulfur values decreased with increased wind speed. Increases in the smoking time to total exposure time ratio increased sulfur values with sulfur dioxide concentrations unchanged. Thus values obtained for extended periods are more reliable than those for short-time high concentrations. The decrease in the absorbing capacity of Liesegang filters was of minor importance, and an additional wetting of the filter in low humidity air was useful. No losses due to desorption occurred within the exposure time in open area. When effective smoking time, concentrations, and wind speeds are unknown, exposure time related sulfur values obtained in field measurements must not be converted into concentration values.

22421

Matthews, B. J. and R. F. Kemp

INVESTIGATION OF SCATTERED LIGHT HOLOGRAPHY OF AEROSOLS AND DATA REDUCTION TECHNIQUES. TRW Systems Group, Redondo Beach, Calif., Air Pollution Control Office Contract CPA 70-4, TRW Rept. 14103-6002-RO-00, 75p., Nov. 1970. 21 refs.

NTIS: PB 209886

APTIC NO. 41575

The feasibility of holographically recording ruby laser backscatter from aerosols of fly ash, chalk dust, and incense over distances up to 15 ft was demonstrated. A mathematical model was derived which yields particle number density estimates from forward, scattered low angle light intensity measurements of reconstructed holographic images recorded under specified conditions. Pulsed ruby laser holograms of diethyl phthalate aerosol of known characteristics were recorded and used to verify the derived mathematical model. A method of real image hologram construction was demonstrated to facilitate direct measurement of scattered light intensities and corresponding spatial locations. A computer program of the derived mathematical model was written and utilized for particle number data reduction. Smoke particles corresponding in size to the wavelength of ruby light, 0.69 microns, were recorded but the limitations on particle size determination were not fully explored.

22422

McCreight, C. K. and C. C. Tien

INTERPRETATION PROBLEMS IN THE CORRELATION MASK SENSING TECHNIQUE. Preprint American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, Sp., 1971. 11 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1061.)

Problems associated with quantitative interpretation of data from correlation-mask sensors (spectrometers) are discussed for various resolutions and for the ultra-violet-visible and infrared spectral regions. High-resolution analysis involves line radiation and the contributions of neighboring lines, while the low-resolution treatment includes band structure parameters. Predicted absorption coefficients or band structure parameters must be averaged over the effective bandwidth of each slit. The mechanisms and importance of beam transmittance attenuation by absorption, scattering, and emission are discussed, and a narrow-band mask device is proposed. (Author abstract modified) 0

22423

Melfi, S. H.

REMOTE MEASUREMENTS OF THE ATMOSPHERE USING RAMAN SCATTERING. *Appl. Opt.*, 11(7):1605-1610, July 1972. 12 refs.

Raman optical radar measurements of the atmosphere are presented which demonstrate that the technique may be used to obtain quantitative measurements of the spatial distribution of individual atmospheric molecular trace constituents, in particular water vapor, as well as those of the major constituents. In addition, monitoring Raman signals from atmospheric nitrogen aids in interpreting elastic scattering measurements by eliminating attenuation effects. Experimental data were utilized to estimate the backscatter cross section for water vapor excited at 3471.5 Å. Analysis of the Raman optical radar technique indicates the potential of the method to measure remotely other molecular species in the atmosphere, such as pollutants, and to observe on a local basis turbulent diffusion, pollution dissipation, and cloud formation using aerosols and water vapor as tracers. A natural extension of this technique may be the observation of resonant scattering from low concentration molecules from high flying aircraft or even satellites. (Author conclusions modified)

APTIC NO. 41188

APTIC NO. 41927

22424

APTIC NO. 41624

Monterosso, S. Cerquiglini and A. Pepe

COMPARATIVE STUDY OF METHODS FOR THE DETERMINATION OF AIRBORNE FLUORIDES. *Pure Appl. Chem.*, 24(4):707-714, 1970. 17 refs.

Gaseous and particulate fluorides from an aluminum plant were analyzed over a 2-yr period. The sampling, separation, and measuring procedures used in the study are described. Particulate and gaseous emissions were collected separately using a stack sampling technique in which samples are collected on a membrane filter followed by absorption in alkaline solution. The membrane filter was nearly 100% effective in collecting the particulate of the aerosol. Retention of gaseous F could be reduced to 2.4-4.9% when the stack effluent was preheated with a heating chamber which surrounds the filter holder. Preheating also enabled the use of high filtration velocities (200-600 l. gas/hr.). After collection, F was separated from interfering substances by steam distillation with sulfuric acid and by microdiffusion. The microdiffusion process was preferred because of decreased operator time and recovery of larger amounts of F. The F concentration was determined by a spectrophotometric method based on decoloration of alizarin-zirconium lake which permits determination of 0.2-20 micrograms with an accuracy of plus or minus 0.06 micrograms for a 10-ml sample. The OCDE method which involves formation of a F-chelate with lanthanumalizarin complexonate was used for comparison. Results obtained by the two methods are in good agreement although the OCDE method has a better sensitivity for smaller concentrations while the alizarin-Zr method has a wider range of application. Since the mean amount of F collected in an area surrounding an Al smelter can be as high as 375-500 micrograms for 24 hr sampling the alizarin-Zr method was preferred for routine determination in the particular case of Al smelting pollution.

22425

APTIC NO. 41622

Moodie, T. W.

MEASUREMENT COMES TO HAZARDOUS DUST AREA CLASSIFICATION. *ISA (Instr. Soc. Am.) Trans.*, 10(3):224-230, 1971. 10 refs. (Presented at the 25th ISA Annual Conference, Philadelphia, Pa., Oct. 26-29, 1970.)

Three degrees of risk are recognized in hazardous dust area work: Non-hazardous, Division 2, and Division 1, in ascending order of risk. Measurements are recommended for classifying a given area as one of the three degrees of risk. The boundary between Non hazardous and Division 2 is crossed when the combustible dust layer thickness exceeds that necessary to propagate a fire. Laboratory tests for finding this minimum ignition layer thickness for an unknown dust as well as field measurements of average dust layer thickness are described. The boundary between Division 2 and Division 1 is crossed when the dust cloud concentration exceeds that necessary to explode when ignited. References for laboratory test methods and test results on dusts are given for dust cloud minimum ignition concentration. Some results of field measurements are also described. A special case of the non-hazardous area bounding on the Division 1 is described for low resistivity (metal) dusts. Laboratory test results on many dusts are described for type grouping dusts into low-resistivity and medium- or high- resistivity dusts. (Author abstract modified)

22426

APTIC NO. 42174

Morikawa, Masahiro and Kenkoku Azuma

A STUDY ON CONTINUOUS MEASUREMENT OF NITRIC OXIDE IN THE CAN OF AUTOMOBILE EXHAUST GAS. (*Jidosha haiki gasuyo chisso sankabutsu renzoku sokutei no kenkyu*). Text in Japanese. Mitsubishi Denko Giho (Tokyo). 46(5):569-575, 1972. 4 refs.

Studies have been made, through the non-dispersive ultraviolet method, on the continuous measurement of the total nitrogen oxides concentration in test specimens by using iodine pentox-

ide and turning nitric oxide to nitrogen dioxide in engine exhausts or in flue gases. As a result, a test apparatus has been manufactured for trial. The apparatus, working on the principle, is provided with a catalytic oxidation chamber, where hydrocarbons, carbon monoxide, and hydrogen are removed in advance, thus being capable of measuring the concentration in the range from several tens of ppm to below 100 ppm without erroneous response of coexisting components. The test apparatus is found to have the following performance: after absorbing the test specimen, the time required to indicate 90% of the true value is about 7.4 sec; the reproductivity of response is within or 1.5%, the zero drift is from 0.6% for two hours (when the full scale is 5000 ppm) to 4.8% (when the full scale is 200 ppm) depending on the full scale. (Author abstract modified)

22427

APTIC NO. 42106

Moss, Owen R., Harry J. Ettinger, and James R. Coulter

AEROSOL DENSITY MEASUREMENTS USING A MODIFIED SPIRAL CENTRIFUGE AEROSOL SPECTROMETER. (*Environ. Sci. Technol.*, 6(7):614-616, July 1972.

A spiral centrifuge aerosol spectrometer, using a partial Archimedian spiral, has been built and calibrated to define aerosol aerodynamic size and particle density. This instrument can define aerodynamic diameters from 0.1-1 micron with a resolution of 5%. Particle aerodynamic size, a function of particle density, shape, and size, must be determined to estimate potential inhalation hazards and when calibrating field air samplers, such as impactors and cyclones. Initially, the instrument was used to define aerodynamic size characteristics of test aerosols used for calibrating size-separating air samplers and aerosols of major air pollution importance. This instrument has measured individual densities of 3.83, 2.53, and 1.27 g/cc m for spherical particles of fly ash, iron oxide, and methylene blue-uranine, respectively. In each case density was independent of particle size. (Author abstract modified)

22428

APTIC NO. 41910

Nakaoka, Akira and Toshi Tomizawa

PREPARATION OF STANDARD GAS CONTAINING SULFURIC ACID AEROSOL. (DETERMINATION OF MICROAMOUNTS OF SULFUR TRIOXIDE IN ATMOSPHERE, PART I). (*Ryusan misuto o fukumu hyojun gasu no chousei. Taiki osen seibun to shite no sansanka io no sokuteiho no kento (sono ichi)*). Text in Japanese. Tokyo Chuo Kenyusho Gijutsu Daiichi Kenkyusho Hokoku (Tech. Lab. Central Res. Inst., Elec. Power Ind., Rept.), no. 71044:1-19, Oct. 1971. 17 refs.

The generator of a sulfuric acid aerosol was designed and constructed to study the determination of the atmospheric concentration of Sulfur acid aerosol. In order to sample and measure the atmospheric concentration of H₂SO₄ aerosol, it is necessary to produce it under the same conditions as in the atmosphere. The apparatus consists of two parts: a container for liquid sulfur trioxide with a capillary tube to take out SO₃ gas and clean the system to purify nitrogen gas; and a system to produce an aerosol by the reaction of SO₃ with moisture and to dilute to the appropriate concentration of the aerosol. The capillary method was the best to permit the stable generation of SO₃ gas at low concentrations. By this method, the apparatus was operated at 51.3 or 3.5 micrograms H₂SO₄/cu m for 25 hr. The measurement of concentration of H₂SO₄ aerosol in this experiment is in the range of 95.5 to 98.6% of the theoretical estimation value, under the condition of humidity 20 to 67%. The millipore filter had a 99% sampling efficiency for the SO₃ gas and the H₂SO₄ aerosol. The gas cleaning jar did not work well for H₂SO₄ aerosol.

22429

APTIC NO. 41620

Nebesar, Boris

SPECIALIZED INSTRUMENTS FOR THE DETERMINATION OF SULFUR BY THE COMBUSTION METHOD. PART II. *J. Chem. Educ.*, 49(1):A9-A10, A12-A17, Jan. 1972. 11 refs.

The conductimetric instruments described are the Minco Potentiometric Sulfur Determinator and the Sulmomat 12 Coulometric titration systems described are the Schoeps CTA 5 S, the Coulomat S, the Coulomatic S Type VK 3A, and the Infotronics (Dohrmann) Microcoulometer. The components and precision of each system are discussed.

22430

APTIC NO. 41014

Newman, L., B. Manowitz, and W. D. Tucker

TWO NUCLEAR TECHNIQUES FOR STACK PLUME STUDIES: ISOTOPE RATIO AND SULFUR HEXAFLUORIDE TRACER MEASUREMENTS. *Trans. Am. Nucl. Soc.*, 15(1):69, June 18-22, 1972. 1 ref.

Two nuclear techniques were directed toward the determination of sulfur dioxide over a wide range of concentrations in air, the tracing of its movement in plumes from power plant smoke stacks, and the determination of its ultimate fate. The Isotope Ratio Tracer method makes use of sulfur already in fuel as a tracer for the sulfur oxides produced by the combustion of that fuel. The measurement of the ratio of (34S) to (32S) is performed with a double-beam isotope-ratio mass spectrometer. Since sulfur hexafluoride is inert under atmospheric conditions, it serves as a physical tracer. This tracer can be employed in an economical manner since it can be measured with a sensitivity of two parts in 10 to the 13th parts of air. This is accomplished by a gas chromatographic technique employing a tritium source with an electron capture detector. The isotope ratio data from an oil plant plume indicated a smoothly increasing depletion of the heavier isotope with increasing distance from the source. These observations were interpreted as resulting from the oxidation of the SO_2 whereby the rate of oxidation of (34S) is slightly greater than that of the (32S) . Quantitative interpretation of the isotopic ratio measurements was possible. The oxidation in the plume appeared to follow a pseudo second-order mechanism. The rate constant for the reaction was approximately 1 h/ppm.

22431

APTIC NO. 42004

Novak, Thaddeus J. and Edward J. Poziomek

DETECTOR COMPOSITION AND METHOD. *Dept. of the Army, Washington, D. C.* U. S. Pat. 3,642,449. 3p., Feb. 15, 1972. 3 refs. (Appl. July 2, 1969, 13 claims).

A colorimetric method is presented for detecting aldehydes and halogenated compounds of aliphatic hydrocarbons, aldehydes, silanes, or phosphates in their vapor state. Compounds containing halogens or aldehyde groups are contacted with an inert absorbent impregnated with a detecting composition comprising an amine, and then the absorbent with its contents is heated. The various absorbents which may be used are silica gel and alumina. (Author abstract modified)

22432

APTIC NO. 42043

Oka, Kenji

DETERMINATION OF ORGANIC LEAD VAPOUR IN AIR. (*Taiki-chu no yukien no sokutei*). Text in Japanese. *Osaka-fu Kogai Kanshi Senta Chosa-Shitsu Kenkyu Hokoku* (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 2:5-7, Dec. 1971. 7 refs.

Air samples were collected by a glass fiber filter, membrane filter, and activated carbon. They were sampled 10 l/min and collected about 100 cu/m through one week. After the activated carbon was added to perchloric acid and nitric acid, and heated, filtered, concentrated, the amount was measured by colorimetry by the dithizone benzene method. In activated

carbon, 1.6 micron/g lead was found. The lead was added to the activated carbon in the same method and the efficiency of collection was measured. It was about 90.1% (standard error 4%). The collection efficiencies of activated carbon scrubbers were studied. The efficiencies of first scrubbers were 50-60%. The collection efficiencies of one scrubber and two series scrubber were compared.

22433

APTIC NO. 42272

Osokina, S. K.

CHROMATOGRAPHIC DETERMINATION OF VINYL ACETATE IN THE AIR BY PRELIMINARY MERCURATION IN A MEDIUM OF LOWER ALIPHATIC ALCOHOLS. (*Khromatograficheskiye opredeleniye vinilacetata v vozdukh s prediaritelnym merkurirvaniyem v srede nizshikh alifaticeskikh spirtov*). Text in Russian. *Gigiena i Sanit.*, 37(3):72-74, March 1972. 3 refs.

Several factors involved in a method for the chromatographic determination of vinyl acetate were investigated. The method involves reaction with mercuric acetate in alcohol solution followed by paper chromatography with a 5:4:1 BuOH-H₂O-Et₂NH mixture, development of the spots with 0.15% diphenylcarbazide, elution with BuOH, and determination at 565 nm. The preferred solvent reagent is a 0.2% Hg(OAc)₂ solution in BuOH containing 0.5 ml HOAc/100 ml. This will detect 0.3 micrograms. If BuOH is used as the solvent in the reagent, the R_f factor is 0.8; if PrHO is used, it is 0.7. An excess of 0.2% of Hg(OAc)₂ reagent is sufficient. One hour is necessary for the complete reaction.

22434

APTIC NO. 41490

Parry, Edward P. and Don H. Hern

PULSE STRIPPING ANALYSIS: A TECHNIQUE FOR DETERMINATION OF SOME METALS IN AEROSOLS AND OTHER LIMITED SIZE SAMPLES. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration*, 6p., 1971. 13 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1119.)

Pulse polarography is an electrochemical technique for the determination of lead concentration down to a nanogram. The metal species is preconcentrated in a mercury drop. Many metal ion species, reducible to metal at an electrode, are equally determinable. The sensitivity of pulse polarography is almost two orders of magnitude greater than ordinary polarography. Resolution and interference characteristics are improved. Pulse polarography shows that the ignition process commonly used in metals determination can result in 20 to 40% loss in lead. (Author abstract modified)

22435

APTIC NO. 41090

Perez, J. M., L. C. Broering, and J. H. Johnson

COOPERATIVE EVALUATION OF TECHNIQUES FOR MEASURING NITRIC OXIDE AND CARBON MONOXIDE. A REPORT OF THE PROGRAM GROUP ON DIESEL EXHAUST COMPOSITION OF THE AIR POLLUTION ADVISORY COMMITTEE OF THE COORDINATING RESEARCH COUNCIL, INC. *Preprint, Society of Automotive Engineers, Inc., New York, 9p., 1972. 7 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720104.)*

A program was conducted to evaluate the measurement methods used to analyze nitric oxide and carbon monoxide in diesel exhaust. Initially, a single cylinder test engine was circulated among participants with poor results. Tests were then

conducted at one site using a multicylinder diesel engine. Non-dispersive infrared, phenoldisulphonic acid, modified Saltzman, and polarographic tests were utilized. Exhaust analyses were conducted at steady-state engine conditions on a 3-minute cycle test. Span gases of unknown concentration were also analyzed. Results of the participants varied but averaged less than plus or minus 5% standard deviation both within (repeatability) and among (reproducibility) the instruments. The short cycle test was in good agreement with the steady-state measurements. No significant difference in the use of Drierite, nonindicating Drierite, or Aquasorb desiccants was evident in sampling system tests. (Author abstract modified)

22436

APTIC NO. 41902

Picknett, R. G.

A NEW METHOD OF DETERMINING AEROSOL SIZE DISTRIBUTIONS FROM MULTISTAGE SAMPLER DATA. *Aerosol Sci.*, 3(3):185-198, May 1972. 8 refs.

A new method was developed to determine the cumulative size distributions of aerosols from data obtained with a multistage cascade impactor and high efficiency backing filter. Given the capture efficiency-particle diameter characteristics of the impactor stages and the density of the particle material, the experimenter need only record the relative masses of deposit on the stage of the impactor and filter after aerosol sampling. With an N-stage impactor, the aerosol is theoretically approximated by a mixture of N 1 monodisperse aerosols in proportions determined from the experimental data, and then the equivalent cumulative size distribution of the mixture is synthesized. The calculation involved is considerable, but is conveniently performed by computer, making the method suitable for routine use. The application to May's cascade impactor was examined in detail, employing a computer program which gives up to twenty-four pairs of values of diameter and cumulative frequency. A wide variety of model size distribution tests showed that the median diameter and the interquartile diameters are determined to within 5 and 15% respectively, provided that the experimental data used are accurate. Furthermore, the shape of the distribution curve is clearly shown, even with bimodal distributions. (Author abstract modified)

22437

APTIC NO. 41471

Pikus, J. M., H. W. Goldstein, and T. R. Riethof

THE REMOTE SENSING OF NITRIC OXIDE FROM AN AIRPLANE OR SPACE PLATFORM. *Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration*, 9p., 1971. 7 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971. Paper AIAA 71-1112.)

Nitric oxide is a pollutant produced in virtually all atmospheric combustion processes as well as through natural decomposition of organic matter. There is serious concern over the effects of NO emission by the supersonic transport upon stratospheric ozone concentration. Determination of sources, sinks, and transport processes as well as study of detailed atmospheric chemistry requires a versatile remote sensing system. A system based on measuring fluorescent light from NO excited by a carbon monoxide laser in either an airplane or a space vehicle is useful in measuring and mapping NO concentrations in the atmosphere. Depending on the mission, the system can be configured as monostatic or bistatic and pulsed or CW. The fluorescence technique, data interpretation, and technical factors, capabilities, and mission profiles of air-borne and satellite borne systems are reviewed.

92

22438

APTIC NO. 41767

Plattig, K. H.

OBJECTIVATION OF ODOR PERCEPTION THROUGH THE EEG. (*Objektivierung der Geruchsempfindung im EEG*). Text in German. Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin), no. 35:25-32, 1971. (Presented at the Colloquium Geruchsbelästigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Two operations were independently developed in Yale (USA) and Erlangen (West Germany) for passing odorous substances of a defined quantity to the human nose. The intensity of the odor and the duration of the odor supply to the nose can be varied. The odor irritation produces a potential in the brain within 500 to 1000 msec which can be recorded on the EEG. The apparatus developed in Germany draws a certain quantity of air and odorant mixture from a bottle and presses it into the nose of the test person. The Allison-Goff apparatus passes an air flow through the odorant bottle for a certain period of time, which is adjustable by a magnetic valve. The clicking of this valve, however, also produces a potential in the brain of the test person which precedes the potential produced by the odorant. A white noise masks the clicking sound. With the odor-evoked potentials, a determination of the perceived odor intensity as well as of the odor threshold has become feasible.

22439

APTIC NO. 41472

Potter, L. B. and M. Feldstein

A DESCRIPTION OF THE PHILLIPS SO₂ MONITOR.

Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronic Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, 3p., 1971. 4 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971. Paper AIAA 71-1113.)

Strict standards for ambient sulfur dioxide requirements result in strict criteria for monitor operations by private industry. Of nine different monitors tested, three are acceptable. One, the Philips PW 9700, senses sulfur dioxide by coulometric reaction with bromine in a potassium bromide solution. The monitor has a high degree of sensitivity, rapid response, and stable output signal. Long operation with no attendance or maintenance is aided by quality construction, internal reagent supply, and elimination of reagent pump. Options include automatic zeroing and calibration, probe filter and heater, and telemetering output. (Author abstract)

22440

APTIC NO. 41907

Poynting, R.

A MINATURE CONIFUGE. *J. Sci. Instr.*, 5(1):52-55, Jan. 1972. 6 refs.

A new version of an established aerosol sampling instrument is described. As in previous models, analysis of the sample is simplified by size separation of the collected particles. The miniature conifuge is self-aspirated, battery-operated, and less than half the previous size, therefore, completely portable. The instrument is constructed of stainless steel and is mounted directly on the driving motor. It will sample unit density particles of diameters between 1 and 8 micron and was successfully used with particles of density up to 10 g/ccu cm. Wind speeds of up to 5 m/sec have no significant effect on sampling rate; it may be operated either upright or horizontally. Design details and operating principles are considered, including deposition and sampling efficiency, effects of density and settling velocity on size-distance calibrations, and extension of size range sampled. Two conifuges are compared. (Author abstract modified)

MEASUREMENT METHODS

22446

22441

APTIC NO. 41135

Raabe, Otto G.

INSTRUMENTS AND METHODS FOR CHARACTERIZING RADIOACTIVE AEROSOLS. *IEEE Trans. Nucl. Sci.*, 19(1):64-75, Feb. 1972. 69 refs.

The importance of characterizing aerosol properties in evaluating the behavior and potential hazards of radioactive aerosols is emphasized. Instruments and techniques for studying the properties of radioactive aerosols including special properties such as chemical form, solubility, and state of electrostatic charge are discussed. Uses of electrostatic and thermal precipitators for electron microscopic observations and measurements, and of various aerodynamic samplers such as impactors, centrifugers, cyclones, and aerosol centrifuges for study of size distribution, particle density, shape factors, and relative specific activity are reviewed. The conventional terminology for describing particle size and size distributions is described with emphasis on the relationships to the factors associated with the potential hazards of inhaling radioactive aerosols. (Author summary modified)

22442

APTIC NO. 41016

Rolla, A.

X-RAY FLUORESCENCE USED IN THE DETERMINATION OF PARTICLE COMPONENTS COLLECTED ON SAMPLING FILTERS FROM THE MILAN CITY AIR. COMMUNICATION I - DETERMINATION OF LEAD, IRON, AND VANADIUM. (*Determinazione mediante fluorescenza dei raggi X di elementi nelle particelle raccolte su filtri dall'atmosfera della città di Milano. Nota I - Determinazione di piombo, ferro e vanadio*). *Text in Italian. Riv. Combust. (Milan)*, 26(4):156-163, April 1962. 10 refs.

The Stazione sperimentale per i Combustibili (Fuel Research Station) is engaged in a systematic survey of air pollution in the city of Milan, with a view to assessing sulfur dioxide and particles contributed by winter heating systems. In order to gain a better insight into the source of pollution and to correlate pollution levels to the specific emitters, the most significant elements have been determined in dust collected in filters. Various methods of analysis are available, and the choice in this case fell on X-ray fluorescence. A general discussion of the problems attending analysis is presented. The procedure followed in determining lead, iron and vanadium is described.

22443

APTIC NO. 41442

Ross, Steven S.

DESIGNING YOUR PLANT FOR EASIER EMISSION TESTING. *Chem. Eng.*, 79 (14):112-118, June 26, 1972. 5 refs.

Methods for reducing the costs of stack sampling procedures are discussed. Some suggestions are made for designing so that good tests can be run. Methods of sampling tall stacks are also described. If the space between the shell and liner is large enough, it may provide a comfortable place for a testing station. However, if there is insufficient space between shell and liner for a testing station, the testing must be conducted from outside the stack. The problems associated with meeting state requirements for particulate concentrations are described. Manufacturers of precipitators and scrubbers often specify the old ASME sampling train for particulate testing. However, this method is rarely considered adequate by the state for showing compliance with pollution codes. Also, the state test procedures will usually indicate higher particulate concentrations than the ASME train, at times making modifications to the control equipment necessary. The Clean Air Amendments of 1970 also call for the installation and use of continuous monitoring equipment. Once such equipment is approved, it must be easily accessible to plant personnel. The requirements of future sampling techniques are also discussed, in relation to the planning of sampling locations.

22444

Ryszka, E.

GUIDELINES TO BE USED IN MEASURING THE DUST CONTENT OF GASES IN DUCTS. *Air Conserv. (English translation from Polish of: Ochrona Powietrza)*, 3(1):32-45, 1969. 7 refs.

NTIS: TT 70-55123/1

Tentative principles are outlined for industrial measurements of the dust content of gases moving in ducts. Dust content should be measured in vertical ducts where possible. Measurements should be made in straight sections of constant shape and cross sectional area. The minimum length of the straight section should be three hydraulic diameters of the duct. Eddy formations and changes in flow direction should be eliminated through the use of sheet elements or mesh. Devices inserted should not lead the precipitation of dust. The measurement sections should be broken down into component areas of equal size related to the particular cross section geometry. The plane of the probe inlet must be perpendicular to the gas stream. The gas should reach a speed in excess of 15 m/sec in the probe with a sampling time of 5 min and should be adjusted for any periodicity in the production cycle. Any two successive measurements that differ by more than 8% must be repeated. Gas density can be calculated from the temperature, static density, chemical composition, and humidity of the gas, and the ambient temperature and humidity. A sample of gas taken for analysis throughout the period of dust collection should exceed 5 l in volume and be taken as near as possible to the dust collection sites.

22445

APTIC NO. 41715

Schnelle, K. B. and R. D. Neeley

AIR POLLUTION ANALYZER DYNAMICS. *Instrum. Technol.*, 19(6):53-55, June 1972. 4 refs.

Some legislation demands air quality analysis with such fast dynamic response that it is important to have more dynamic information about the analyzers used. Pulse testing was, therefore, applied to two sulfur dioxide and two carbon monoxide analyzers. For the most part, automatic monitoring systems have been designed without much regard to the dynamics of the continuous monitors employed. However, the San Francisco Bay Area Pollution Control District has a regulation which allows 0.50 ppm SO₂ for a three-minute period. The dynamically faster SO₂ instruments can be described by two time constants, one of about five seconds and one of about 50 seconds, plus a dead time of about 20 seconds. A transfer function was simulated on an analog computer, and a square wave which represented a minimum violation under the Bay Area District regulations was applied as an input. The output showed that the regulation, when strictly interpreted, is beyond the dynamics of even a better grade instrument. The theory and applications of pulse testing are described.

22446

APTIC NO. 41602

Segovia, Jose L. De, C. S. Martin, M. Sanchez-Avedillo, and D. Cervera

ANALYTICAL PROBLEMS IN ATMOSPHERIC COMPOSITION STUDIES BY MEANS OF MASS SPECTROMETRY. (*Problemas del analisis de la composicion atmosferica con espectrometros de masas*). *Text in Spanish. Elect. Fis. Apl.*, 14(1):134-137, 1971.

The drawbacks to the utilization of mass spectrometry for air pollution study purposes include the operating conditions at 0.0001 torr pressures and the secondary reactions occurring within the spectrometer, thus distorting the analytical results. The first drawback can be provided for by introducing the gas sample under well established pressure and flow rate conditions and applying the corresponding corrections after adaptation to the required vacuum. The second drawback could be corrected by modification of the ionization chamber of the instrument. The ionization chamber should be separated from the incandescent filament by means of a fine porosity screen

which should allow the establishment of a pressure difference between the ion producing region and the incandescent filament. Thus the amounts of secondary compounds could be decreased to prevent their interference with the analytical results. The high sensitivity, the continuous data recording and thus the possibility of their feeding into computers, applicability to source monitoring, and possibility of combining with gas chromatography make mass spectrometry a valuable tool in the field of air pollution studies. The instrument also provides the means to investigate the reaction mechanisms occurring between the atmospheric pollutants, to anticipate eventual pollution conditions, and is of low cost as compared to the amount of information supplied.

22447

APTIC NO. 41546

Shigeta, Yoshihiro

PROBLEMS OF ODOR CONTROL LAW AND BAD ODOR MEASUREMENT. (*Akushu boshiho to sokutei no mondaiten*). Text in Japanese. *Kagaku Kojo (Chem. Factory)*, 16(5):22-26, May 1972.

Thirteen compounds, including five sulfur compounds, four nitrogen compounds, and acrolein, acetone, butylene, and butyric acid, were listed as the control odors in the new regulations. The threshold values of the individual compounds are different: 100 ppm for acetone, about three ppm for sulfur dioxide, 0.04 ppm for ammonia, and 0.005 ppm for hydrogen sulfide. Odors may be sampled by an adsorption method, chemical method, steam method, or high temperature gas method. Analytical methods including gas chromatography, gas chromatography-mass spectroscopy, infrared spectroscopy, and nuclear magnetic resonance spectroscopy can only be used for concentrations higher than 0.1 ppm. Therefore, for concentrations in the ppt order, the sample must be concentrated.

22448

APTIC NO. 41146

Shimazaki, Toshio

A STUDY ON A SIMPLE NITROGEN OXIDE METER FOR AUTOMOTIVE EXHAUST GAS. (*Jidosha haiki gasu-chu no chisso dankabutsu kani sokuteiki ni kansuru kenkyu*). Text in Japanese. *Kagaku Gijutsu Shiken Kenkyu Hojokin ni Yoru Shiken Kenkyu Seikashu (Prog. Rep. Pilot Res. Minist. Transport. Sci. Technol. Test Res. Subsid.)*, no. 17:111-116, Aug. 1971.

A simple nitric oxide meter consisted of two major systems of sampling and detecting. The characteristics were tested. By a combination of a cooler and dryer, the effect of moisture in the exhaust gas was totally eliminated. Two cooling pipes made of glass and teflon were tested for their characteristics. A life test of dryers provided data of the durations. An infrared source having an output of 1.5 times that of a previous source, but consuming only half the power, was developed. The temperature effect on the detector sensitivity was only 1/3 of that of the previous detector, and 5% NO in air showed the best sensitivity of the detector. The interfering gas concentration was 0.6% for water vapor at NO concentration 104 ppm, 9.0% for carbon monoxide at NO concentration 5.2 ppm, 14.0% for carbon dioxide at 12.1 ppm, and 1.5% for propane at 38.1 ppm. All the desired characteristics were confirmed by tests.

22449

APTIC NO. 41286

Sievering, Herman and Raj Nittra

THE EFFECT OF COHERENCE AND MULTIPLE SCATTERING ON LASER RADAR AIR POLLUTION MEASUREMENTS. *Michigan Univ., Ann Arbor, Center for Remote Sensing Information and Analysis and Environmental Protection Agency, Washington, D. C., Water Quality Office, Proc. Symp. Remote Sensing Environ.*, 7th, Ann Arbor, Mich., 1971, vol. 1:751-757. 11 refs. (May 17-21.)

All laser radar measurements of atmospheric particulates to date have neglected consideration of the coherence properties of laser sources. The governing equations are reviewed. Discrimination of backscatter due to molecular constituents from that due to pollutant particulates may be achieved by operating the laser radar in two modes: one, a multishot average of spatially coherent detection utilizing a single mode laser source so that the entire instantaneous scattering volume gives rise to dependent scattering, and the second, a multishot average of incoherent detection. A Monte Carlo simulation was performed using parameters pertinent to laser radar. Results show that multiple scattering effects cause many more photons to be entirely lost from the beam long before appreciable time delays and concomitant pulse distortion occurs. Multiple scattering alone will cause spurious effects long before any degradation in coherence is observed. Thus, laser coherence properties can substantially increase the detected power. Given a coherent source, dependent scattering can allow signal return off molecular atmospheric constituents to dominate over that due to pollutant particulates. Multiple scattering does not appear to degrade coherence properties in lower atmospheric laser radar applications. For ranges greater than approximately 4 km in clean air atmosphere and 1 km in polluted atmospheres substantial energy is, however, lost by the propagating pulse due to photons being multiply scattered out of the beam.

22450

APTIC NO. 42276

Simmons, L. L. and J. A. Nutant

MEASURING THERMAL PLUMES IN THREE DIMENSIONS. *Power Eng.*, 75(10):44-45, Oct. 1971.

Determining the three-dimensional distribution of waste heat in a thermal plume can be done by a portable or a fixed system. With either, temperatures must be recorded as functions of surface dimensions, depth, and time. The system's accuracy depends on what methods were chosen to collectively measure these parameters. Portable systems can use remote or in-situ sensing. Remote sensing relies on infrared radiation detection through overflights or from land-based scanning units. In-situ sensing may be done with temperature dependent resistance elements called thermistors. The fixed system may use anchored buoys or fixed platforms; data from either are recorded for retrieval or telemetered into a central receiver. Thermal monitoring techniques are considered, as well as improvements underway. Data are being reduced by computer and a plotting routine will be incorporated to speed the mapping of the plume.

22451

APTIC NO. 42284

Sinomov, V. A., V. D. Bartenev, and E. S. Brenner

RAPID COLORIMETRIC METHOD OF DETERMINING META-PHENYLENEDIAMINE IN THE AIR. (*Bystryi kolorimetricheskii metod opredeleniya meta-fenilendiamina v vozdukh*). Text in Russian. *Gigiena i Sanit.*, 35(5):99-100, May 1970.

A rapid colorimetric method of determining meta-phenylenediamine in the air, based on a condensation reaction of the former with *n*-dimethylaminobenzaldehyde, is described. The reaction products, obtained in a solution containing sulfuric acid, is of yellow color, and its color intensity is dependent on both the reagent concentration and the pH-value. Maximum sensitivity in slightly acid medium was observed. Experiments were carried out to determine the optimum conditions for the determination. The sampling was made at a rate of 0.3 l through two absorbers containing 0.01 *n*-sulfuric acid. The optical density, which was stable over 6 hours, was measured in a cuvette with 10 mm layer thickness. The sensitivity was 0.5 micron. While the above method is not specific in the presence of aniline and other aromatic amines, it is not disturbed by ammonia, hydroxylamine, ethylenediamine, triethanolamine, or ethanol. The method can be used in determining the total aromatic amines as well.

2452

APTIC NO. 41794

Smit, Gialt R. and Claudio Gatti

AIR POLLUTION MONITORING AND IMMEDIATE ALARM SYSTEMS. (Sistemi di rilevamento e allarme immediato contro l'inquinamento atmosferico). Text in Italian. *Inquinamento*, 1(1):33, March 1972. 5 refs.

Air pollution monitoring serves three main purposes, the determination of pollution distribution over large geographic areas so that characteristic maps can be drawn, long-term determination of changes and movements of pollution levels, and short-term determination of pollution levels on a limited area. Sulfur dioxide serves as an indicator of the level of pollution on the premise that if increased atmospheric stability increases SO₂ concentration, it will also increase proportionately the level of the other pollutants. A network of monitoring stations connected to a computer can quickly detect each increase in the level of overall pollution if a reference level corresponding approximately to a 30-day span has been established. Median hourly SO₂ concentrations of different and of the same monitoring station are not comparable because many factors affect the measured concentrations. To eliminate these factors, median hourly concentrations are corrected to a reduced concentration so that the various median hourly concentrations are reduced to a single value which represents the true level of atmospheric pollution. A certain minimal number of monitoring stations is required for a given industrial area for these levels to be reliable. A pollution alert level will depend on the velocity with which the pollution level increases with sudden increase in atmospheric stability, and on the SO₂ concentration which produces a malodorous atmosphere which is an empirical factor (350 micrograms/cu m for Rijnsmond in Holland). The pollution level in the case of a temperature inversion increases with the square root of time. Since SO₂ enters the atmosphere at an altitude between 80 and 200 m, monitoring stations must be located no less than 2-3 km from a major source of pollution. The representation of pollution levels by means of a frequency distribution curve on a logarithmic scale has proven very useful in pollution forecasting. 0

22453

APTIC NO. 41497

Snowman, L. R. and R. J. Gillmeister

INFRARED LASER SYSTEM FOR EXTENDED AREA MONITORING OF AIR POLLUTION. Preprint, American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics, New York; Environmental Protection Agency, Washington, D. C.; Inst. of Electrical and Electronics Engineers, New York; Instrument Society of America, New York, N. Y.; National Aeronautics and Space Administration; and National Oceanic and Atmospheric Administration, 9p., 1971. 7 refs. (Presented at the Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper AIAA 71-1059.)

An atmospheric pollution monitoring system using a spectrally scanning laser was developed for extended area monitoring of air pollution. The system has an operational range of 10 mi or more under conditions of good visibility. Ethelene gas is detectable within 2.7-144 ppb over 2 mi; ammonia is measurable within 4-216 ppb over 2 mi. The system is adaptable to other tunable lasers and for the detection and identification of ozone, sulfur dioxide, carbon monoxide, nitric oxide, nitrogen dioxide, carbon dioxide, and representative hydrocarbons. Operating in the middle infrared region, the system uses retroreflectors to measure average concentrations over long paths at low, safe power levels. The concept shows promise of meeting operational needs in ambient air monitoring and providing new data for atmospheric research. (Author abstract modified) 0

22454

APTIC NO. 41279

Sokolovskiy, D. V., G. K. Alekseyeva, and Ye. Ye. Mckeyev
THE USE OF GAS CHROMATOGRAPHY TO DETERMINE CONCENTRATIONS OF OXIDES OF

NITROGEN. Council for Mutual Economic Aid (CEMA), and Yugoslav Socialist Federated Republic, Smzheniye Zagryaz. Vozdukh Gorodakh Vykhlopnyimi Gazami Avtomob., Proc. Symp., 2nd, 1971. 20 refs. Translated from Russian. 13p.

Different variants of the chromatographic determination of the components of a gaseous mixture of oxygen, nitrogen, nitric oxide, and carbon monoxide were developed. Analysis time is reduced and reproducible results are obtained. The detector was a katharometer. The detector current was 140 mA. Argon was used as the carrier gas with a flow rate between 40 and 100 ml/min. Columns used included silica gel, molecular sieves type CaA, and molecular sieves of the NaX type. A gas reaction chromatography method was also developed for determining the concentration of nitrogen oxides in gaseous mixtures containing oxygen. The method yields separate and summed determination of oxides and peroxides of nitrogen first reduced to molecular nitrogen. Nitrogen is determined chromatographically. Reduction of the oxides of nitrogen can be carried out with catalysts at elevated temperature in the presence of a gas reducer. Catalysts include Pd by Al₂O₃, or CuO-Cr₂O₃ by Al₂O₃. Carbon monoxide, hydrogen, and gaseous hydrocarbons can be used as the gas reducer. The gas reducer can be delivered with the oxides of nitrogen.

22455

APTIC NO. 41460

Stevens, Robert K. and J. A. Hodgeson

NEW INSTRUMENTS FOR MEASUREMENT OF GASEOUS POLLUTANTS. Preprint, 13p., 1972 (1. 10 refs. (Presented at the International Air Pollution Control and Noise Abatement Conference, Jonkoping, Sweden, 1971.)

Results of chemiluminescent studies have led to commercially available air pollution monitors for the measurement of sulfur dioxide, hydrogen sulfide, nitric oxide, nitrogen dioxide, and ozone. These systems allow unattended continuous monitoring at higher reliability and lower operating cost than present methods, and can replace classical monitoring approaches. A flame photometric detector was developed to measure total gaseous sulfur in ambient air which is equivalent to SO₂ in many urban areas. Ozone concentrations within 0.003-30 ppm can be determined by utilizing the reaction between ozone and ethylene and measuring the intensity of the emission of the luminescent species produced. The intensity of the emission is directly proportional to the ozone concentration. Three methods for the measurement of nitrogen oxides are used. Using the reaction with ozone, NO can be measured down to 0.005 ppm. Using a thermal catalytic reaction, NO₂ can be measured in the same device. A system is in development now for sequential measurement of NO, NO₂, NO, and NO₂ ammonia. Application of other chemiluminescent reactions will probably lead to the measurement of many more pollutants such as formaldehyde, halogens, selenium, and arsenic.

22456

APTIC NO. 41678

Stevens, Robert K., Thomas A. Clark, Clifford E. Decker, and Louis F. Ballard

FIELD PERFORMANCE CHARACTERISTICS OF ADVANCED MONITORS FOR OXIDES OF NITROGEN, OZONE, SULFUR DIOXIDE, CARBON MONOXIDE, METHANE, AND NONMETHANE HYDROCARBONS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 35p., 1972. 22 refs. (Presented at the Air Pollution Control Association Meeting, Miami, Fla., June 1972.)

Ambient measurements of oxides of nitrogen, ozone, sulfur dioxide, carbon monoxide, methane, and nonmethane hydrocarbons were made with new instrumental procedures in field tests in St. Louis, Missouri, and the results compared with those obtained by the reference methods currently recommended by the EPA. Performance characteristics of the developmental monitors are presented. Instrumental methods evaluated include gas phase chemiluminescent methods for measuring O₃ and nitrogen oxides; gas chromatographic

methods for measuring SO₂, CO, CH₄, and total hydrocarbons; coulometric methods for measuring nitrogen dioxide and SO₂, and a flame photometric method for measuring SO₂. The Beckman coulometric measurements for NO₂ were significantly lower than measurements with a chemiluminescent monitor during peak concentrations. However, where mean concentrations of NO₂ for 24 hours were below 0.1 ppm, an agreement of better than 90% of absolute concentration of NO₂ could be obtained among the Jacobs Hochheiser, Saltzman coulometric, and chemiluminescent methods. Chemiluminescent NO₂ monitors as well as the coulometric SO₂ analyzer exhibited excellent zero and span stability. Nonmethane hydrocarbon concentrations, measured gas chromatographically, often exceeded 0.24 ppm between 6-9 am. Carbon monoxide concentrations measured gas chromatographically were 5 to 6 ppm lower than values obtained with a nondispersive infrared analyzer, coulometric measurements, and flame photometric measurements had correlations of better than 95% with the West Gaeke coulometric method. (Author abstract, modified)

22457

APLIC NO. 41001

Silver, J. R., Donald L. and Y. George Kim

DYN MIC COMPUTER TECHNIQUES FOR VEHICLE EMISSION DEVELOPMENT. Preprint, Society of Automotive Engineers, Inc., New York, 10p., 1972, 3 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 10-14, 1972, Paper 720211.)

Development of engine-vehicle prototypes for low emissions and optimum fuel control characteristics has been facilitated through use of a computerized emissions test system. Simultaneous on-line sampling of exhaust species concentrations, fuel consumption, spark advance, pressures, and temperatures provides both graphical and computed outputs of several vehicle parameters that are important to development programs. On-line display of vehicle air-fuel ratio is continuously supplied. Either of two federal driving cycles or any random driving schedule may be employed. Dynamic calibration, range sensing, and zero-drift correction keep operator interaction and errors to a minimum. Capability for reprocessing, plotting, and on patching stored data provides increased computational flexibility. (Author abstract)

22458

APLIC NO. 41961

Stober, Werner, Hermann Flachbart, and Christoph Boose

DISTRIBUTION ANALYSES OF THE AERODYNAMIC SIZE AND MASS OF AEROSOL PARTICLES BY MEANS OF THE SPIRAL CENTRIFUGE IN COMPARISON TO OTHER AEROSOL PRECIPITATORS. *J. Colloid Interface Sci.*, 40:109-120, April 1972, 13 refs.

The spiral centrifuge, a new particle-size spectrometer for aerosols, facilitates the precipitation of aerosols in the size range from less than .000008 to .0006 cm in diameter. The particles are separated according to their aerodynamic diameter along a strip foil of 180 cm length. The calibration of the deposit strip in terms of aerodynamic diameters permits the determination of the size distribution by a count analysis. The mass distribution can be obtained by a gravimetric or, in case of a fluorescent test aerosol, by fluorometric analysis. Due to small irregularities of the deposition patterns, empirical corrections may apply to the experimental data. However, comparison of centrifuge results with data from other precipitators, such as electrostatic and thermal devices or cascade impactors, indicates that for three fluorescent test aerosols, practically no corrections were necessary because of the random nature of the deviations. The spiral centrifuge gives consistent results over the whole size range investigated. With the aerosol entrance employed, substantial particle losses to the entrance section seemed to occur above .0002 cm. (Author abstract, modified)

96

22459

APLIC NO. 41433

Sudo, Teruyuki, Kenzo Sakurai, Kazuko Ito, Yoshinobu Mori, and Mine Mori

ANALYSIS OF AIR, POLLUTED BY ORGANIC MATTERS, BY GAS CHROMATOGRAPHY (REPORT NO. 8). (*Yukibutsu osen kuki no gasu kuromatogurafu ni yoru bunseki (Daihachiho)*). Text in Japanese. Mie-ken Eisei Kenkyusho Nenpo (Annu. Rep. Mie Prefect. Public Health Lab.), no. 17:76-82, 1970, 4 refs.

A combination of two columns, one containing a high polar packing agent to separate the polar and non-polar components, was used for the separation and the study of retention times of components in air from a petrochemical industrial area. The polar column was four mm in diameter and 25 cm long stainless tube packed with either 20% ODPN and diasolid M, 30% PEG and diasolid M, or 30% TCEP and diasolid M; the separation column was 3 mm in diameter and 2 m long, packed with 5% TCEP and diasolid M with 20% ODPN, low molecular weight nonpolar compounds were easily separated out, whereas low molecular weight polar compounds such as acetone, dimethyl sulfide, and acetaldehyde were retained. Columns with 30% PEG showed almost the same effect as that with 20% ODPN except that they retained ketones more than aldehydes. Columns with 30% TCEP had small retention ability on non-polar substances such as hydrocarbons, but showed large retention ability on polar substances. Therefore, they are suitable for the separation of petrochemical flue gas or automobile exhaust gas that includes large amounts of hydrocarbon. A system consisted of three columns, one column packed with three meters 10% conval 20 and diasolid M and two meters 10% DNP and diasolid M added to columns with 20% ODPN, was used for the analysis of a mixture of gases including iso-pentane, ethyl mercaptan, and eight other compounds. The added column was immersed in liquid O₂ before the gases were allowed to pass into the next column. All four hydrocarbons were separated from the polar substances.

22460

APLIC NO. 41582

Sudo, Teruyuki, Kenzo Sakurai, Kazuko Ito, Yoshinobu Mori, and Mine Mori

ANALYSIS OF AIR POLLUTED BY ORGANIC MATTERS BY GAS CHROMATOGRAPHY (REPORT NO. 7). (*Yukibutsu osen kuki no gasu kuromatogurafu ni yoru bunseki (dianahoh)*). Text in Japanese. Mie-ken Eisei Kenkyusho Nenpo (Annu. Rept. Mie Prefect. Public Health Lab.), no. 17:69-75, 1970, 6 refs.

A mixture of iso-pentane and ethyl mercaptan was studied for absorption abilities in various gas chromatographic columns. The sample contained 255 ppm iso-pentane and 1930 ppm ethyl mercaptan. The first column tested was three mm in diameter and packed with 10% conval for three meters and 10% DNP for two meters. No absorption occurred for iso-pentane, but 20% of the ethyl mercaptan of the first injection was absorbed. From the second to the fourth injection, no ethyl mercaptan was absorbed. The ethyl mercaptan concentration changed significantly during a period of 20 hrs. Experimental results on various columns including glass pieces, celite 545, chromosorb W, diasolid S, gaschrom Q, and chromosorb G showed that the non-polar iso-pentane did not absorb in any of the columns, whereas absorption of ethyl mercaptan occurred more or less in every column.

22461

APLIC NO. 41668

Tabata, N. and M. Mori

DETERMINATION OF FINE PARTICLE SIZE BY LASER BEAM. *Flec. Eng. Japan*, 88(6):74-81, 1968, 5 refs.

Fine-particle size can be determined by measuring the scattered light whose wavelength is nearly the same as the particle diameter. The average diameter and dispersity of polydispersed particles can be determined if the diameter and

distribution of monodispersed particles are given. For sub-micron particles which are important in aerosol science a helium-neon laser having wavelength of 0.6328 micron is suitable to use as a light source, because of its highest known radiance in monochromatic light, and a linearly polarized and highly directed beam. Scattering diagrams of He-Ne laser beam by dioctylphthalate particles whose refractive index is 1.49 were calculated from Mie's formula. As some examples, those by particles of 0.005, 0.1, 0.2, 0.3, 0.4, and 0.5 micron radius were shown in the case of monodispersed particles. In the case of polydispersed particles, those by particles whose diameters have logarithmic normal distribution were shown. The geometric mean radii were 0.15 micron and 0.3 micron and the geometric standard deviations were 1.0, 1.1, 1.2 and 1.3. The mean diameters and dispersities of the particles produced by the L. Mer-type dioctylphthalate particle generator were measured. The geometric mean radius of particles and the standard deviation were 0.2 micron and 1.2, respectively, at the boiler temperature of 115 C and the reheater temperature of 135 C. When the temperature was decreased to 105 C at the boiler and 125 C at the reheater, the geometric mean radius and standard deviation were 0.3 micron and 1.3, respectively. Apparatus for light scattering measurement is described, and measurement accuracy is discussed.

22462

APTIC NO. 41596

Taguchi, Naoyoshi

GAS DETECTOR. (*Gasspuergeraet*). Text in German. (*Assignee not given*.) W. Ger. Pat. Appl. 2,016,988, 16p., April 6, 1970. (8 claims)

Traces of gases and fumes (for example, hydrogen, carbon monoxide, acetylene, propane, butane, gasoline, and illuminating gas) are detected in the air by a device based on shaping bodies of either n-semiconductors or p-type semiconductor. The conductance of the former group increases, and that of the latter group decreases, because of the effect of reducing gases present in the tested air. Changes in conductance are accelerated by heating the bodies with an electric heater or with a semiconductor heater of a specific resistance with a negative temperature coefficient. The heater is connected in series with an adequate resistor and may serve at the same time also as at least one of the electrodes through which current is led through the detector body. On applying a voltage on the conductor system, an alarm signal can be created if the conductance changes exceed certain pre-set limit values of gas concentration in the tested air.

22463

APTIC NO. 41158

Tamori, Y., K. Harada, T. Shirasawa, W. Imase, and A. Tajiri
DUST TUBE COLLECTION EFFICIENCY (*Dasuto chubu no hoshu koritsu ni suite*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan Soc. Air Pollution) 10:39, 1969. 3 refs. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The theory of glass fiber air filter collection rate was applied to the dust tube collection rate, and the collection performance capacity rates were compared with the actual collection rate obtained by an experiment. The theoretical filter collection calculation was based on the single fiber theory, the combined collection rate of a layer of single fibers, and logarithmic filter theory. Of various factors and parameters influencing the collection rate of a dust tube, inertia collision and direct interception mechanism which are found in fiber filter dust collection conditions were taken into special consideration. In the experiment, nitrogen gas was used as carrier, and an aerosol of dioctyl phthalate was created by steam condensation. The aerosol was diluted by air and blown into a duct. Measurements were taken at the entrance, middle, and the exit of the duct, and measured by digital counter light scattering method. Results are not given.

22464

APTIC NO. 42181

Tamori, Yukio, Nobuyuki Kogure, Kazunari Imagami, and Tadao Shirasawa

STUDIES ON DUST SAMPLERS. (*Dasuto sanpita ni kan suru kenkyu*). Text in Japanese. Preprint p. 119-126, June 1972. (Presented at the Public Nuisance Resources Research Institute Research Seminar, Tokyo, Japan 1972.)

The sampling ability of dust tube samplers for the measurement of dust was studied. The measurement of dust concentration was based on standard JIS-Z-8808. However the sampling characteristics of the dust tube sampler used in this method are not reliable. The theory in the area of air filters was applied to the problem of the dust tube, and a theoretical curb line of sampling rate was deduced. Experimental data fit this theoretical estimation if a correction relating to packing layer was made. Therefore the packing ratio is known, the sampling ratio can be obtained by this theoretical curb line. The dust tube sampler requires a complex technique for measurement and training. The paper holder sampler using the glass fiber filter paper can sample dust which is sub-micron in size. This new sampler has great advantages such as: high sampling rate, less damage from pressure, small size and light weight, shorter time for measurement, and ease for changing the filter paper.

22465

PTIC NO. 41055

Tanaka, Masao, Takahiro Matsugaki, and Y. Ika Tomita

RECENT TRENDS IN AIR POLLUTION MEASUREMENT EQUIPMENT. (*Taiki osen kensokuki no ukin no dokok*). Text in Japanese. *Bunseki Kiki* (Analysis Inst.) 10(5):303-311, May 1972.

Principles of various analysis and measurement equipment are reviewed with illustrations. For analysis of carbon monoxide, oxidation condensation method, gas chromatography, infrared gas analyzer (non-dispersive type), and detectors are cited. For sulfur dioxide analysis, flame photometry, detector, electroconductivity analyzer, absorption spectrophotometry, and potentiometric method are discussed. For analysis of nitrogen oxides, the Saltzman method, chemiluminescence analyzer, and electrochemical analyzer are discussed. For analysis of oxidant, the iodometric potassium method and the chemiluminescence method are discussed. The last category is divided into the nitric oxide, rhodamine, and ethylene methods. For analysis for hydrocarbons, a flame ionization detector is used. The calibration method using a permeation tube is discussed briefly with an illustration.

22466

APTIC NO. 41962

Thorpe, J. P. and E. A. Schweikert

A RAPID METHOD FOR ASSAYING SULFUR USING PROTON ACTIVATION ANALYSIS. *Nucl. Instr. Methods*, 99(3):461-467, 1972. 5 refs.

A novel application of charged particle activation analysis is presented involving short irradiations of 1 sec. coupled with the measurement of very short-lived nuclides. The case studied deals with the determination of sulfur using sulfur-32 positron and neutron, and chlorine-32. This activation reaction features a high abundance target isotope and a product nuclide of 300 millisecond half-life emitting high energy positrons. Counting was performed with a Cherenkov detector at the irradiation site immediately after bombardment. The experimental approach for optimizing the counting conditions is described and the activation curve for $^{32}\text{S}(p,n)^{32}\text{Cl}$ is given for proton energies up to 22.5 MeV. The sensitivity based on experimental data is estimated at approximately 50 micrograms/sq. cm. The application of this technique to petroleum products with sulfur contents ranging from 3.18% to 0.72% is discussed.

22467

APTIC NO. 41763

Tsukahira, Kazuyoshi

MEASUREMENT METHODS IN PUBLIC NUISANCE—ESPECIALLY ON MEASUREMENT METHODS PRO-

VIDED BY THE REGULATIONS FOR PUBLIC NUISANCE. (Kogai no sokuteiho-Kogaiho kan-keihoreichu no kensaho o chushin ni site) Text in Japanese. *Nippon Eiseikensa Gishikai Zasshi* (Jap. J. Med. Technol.), 21(5):524-532, May, 1972.

Measurement methods are divided into two types. One for measuring environmental factors and the other for examining man's health. Pollutants are classified into dust, soot, suspended particulate matter, dust fall, sulfur oxides in smoke, sulfur oxides in air, harmful substances such as cadmium and its compounds, bases, hydrogen chloride, fluorine, hydrogen fluoride, silicon fluoride, lead and its compounds, nitrogen oxides, carbon monoxide, lead compounds, nitrogen oxides contained in automobile exhaust gases, oxidants, and 28 special deleterious substances including ammonia, hydrogen sulfide. Measurement methods for each pollutant are discussed based on the Air Pollution Control Law. As for dust fall and special deleterious substances, measurement methods have not been settled. Measurement methods of noise level based on the Noise Regulation Law are stated.

22468

APTIC NO. 41719

Tsuda, Satoru and Akira Yokohata

ANALYSES OF POLLUTANTS AND PROBLEMS. (Osen busshitsu no bunseki to sono mondaiten) Text in Japanese. *Bunseki Kiki* (Analysis Instr.) 10(5):371-327, May 1972. 7 refs.

Analytical methods for the determination of sulfur oxides, carbon monoxide, chlorine, hydrogen chloride, fluoride, nitrogen oxides, cadmium, and lead are reviewed. Flame photometric detectors for sulfur dioxide analysis were studied. The sample was mixed with oxygen, and then burned with hydrogen flame, and the intensity of the absorbed light of wavelength at 394 millimicron was measured. By this method, the SO₂ can be determined as low as the ppb levels. Flame ionization detection for CO and carbon dioxide determination as methane is also considered. The limits for chlorine discharge, hydrogen chloride, and fluoride emissions are set at 30, 80, and 1-20 mg/cu m, respectively; methods for determinations of these pollutants at or below these levels are included. Although no regulations are established for odorous compounds, the list will include ammonia, methyl mercaptan, ethyl mercaptan, dimethyl sulfite, diethyl sulfite, hydrogen sulfite, methyl amine, ethylamine, trimethylamine, butylene, butyric acid, acetone, and acrolein.

22469

APTIC NO. 41526

Ugolini, Francesco

A MOBILE LABORATORY FOR MONITORING ENVIRONMENTAL POLLUTION. (Un laboratorio mobile per il controllo dell'inquinamento ambiente). Text in Italian. *Ann. Ist. Super. Sanita* (Rome), vol. 7:67-78, 1971.

The study of a special mobile laboratory, equipped with the instrumentation necessary to monitor the pollution of air, waters, and soil led to the design and implementation of a vehicle the specifications of which are described. The vehicle does not have fixed instrumentation, but has the basic equipment necessary for the installation of different instruments, which may vary according to the tasks required in various zones of operation. Some scientific instruments have been manufactured specifically to fit the desks and available space in the vehicle, so that they can be assembled or removed very rapidly; the operative performances of the laboratory are thus improved.

22470

APTIC NO. 41656

TRW Systems Group, Redondo Beach, Calif. and Scott Research Labs., Inc., San Bernardino, Calif.

VEHICLE EMISSIONS SURVEILLANCE STUDY. *APRAC Proj. CAPE-13-68, APTD-1076*, 178p., Aug. 20, 1971. 9 refs.

NTIS: PB 209827

The objective of this study is to recommend optimal procedures for conducting an automobile exhaust emissions field surveillance program. The following procedures were recommended for ensuring precise and accurate emissions measurements: When more than one laboratory is involved in performing a surveillance program, vehicles of the same general class should be divided equally between laboratories to avoid the possibility of introducing regional or laboratory procedures biases when evaluating the performance of the particular class relative to other classes. Periodic cross-reference checks of instrument systems using known gases should be performed. Calibration points (approximately six) should be fitted with a logarithmic curve (Beer's Law mode). The general maintenance state of the instrument system should be monitored using quality control type charts to record the variation of both the gain setting and mid-span point. Optimal procedures and system configurations to be applied in the surveillance programs were defined for three basic temperature conditioning test procedures: a 12-hour cold soak to cool the power train to ambient temperatures as specified in the current Federal test procedure, accelerated power train cooling to near ambient temperature conditioning, and temperature conditioning to a stabilized engine operating temperature. The carbon monoxide emissions variability is larger than nitrogen oxides and hydrocarbon emissions and therefore will generally control test fleet size. Relative to their mean emissions, both 7-mode mass and concentration measurements are nearly identical within and between vehicle variability. Mass emissions (particularly CO) have significantly greater sensitivities to engine temperature state than do composite emissions. Regional biases may exist in emission measurement programs which are primarily attributable to vehicle differences.

22471

APTIC NO. 41527

Vivilecchia, R., M. Thiebaud, and R. W. Frei

SEPARATION OF POLYNUCLEAR AZA-HETEROCYCLICS BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY USING A SILVER-IMPREGNATED ADSORBENT. *J. Chromatographic Sci.*, 10(6):411-416, June 1972. 25 refs. (Presented at the Canadian Chemical Conference, 34th, Halifax, Nova Scotia, May 31-June 2, 1971.)

Fast, high-efficiency liquid chromatographic separations of polynuclear aza-heterocyclic hydrocarbons were obtained with silver ion impregnated on the surface of Zipax chromatographic packing. Many of them are known to be present in polluted air, and particularly resulting from car exhaust. Between 1000 and 2000 theoretical plates per meter were generated for these compounds at velocities between 0.3 and 3.2 cm/sec. Acridine could easily be detected at the 1-ng level per injection. The compounds were separated by donor-acceptor complexing between the adsorbed silver ion and the heterocyclic nitrogen atom. The elution order can be explained on the basis of basicity and steric accessibility of the nitrogen lone-pair. There is some evidence, however, for a competing retention process, based on adsorption. (Author abstract modified)

22472

APTIC NO. 40973

Walther, Eric G.

CARBON MONOXIDE MEASURING METHOD AND DEVICE. (Environment One Corp., Latham, N. Y.) U. S. Pat. 3,640,688. 7p., Feb. 8, 1972. 1 ref. (Appl. Sept. 15, 1969, 16 claims).

A method and apparatus are provided for measuring trace amounts of carbon monoxide in a sample gas. The technique comprises filtering a portion of the sample gas to free it of condensation nuclei. The filtered, carbon monoxide-bearing gas specimen is then reacted with a polymer to induce thermoparticulate production of nuclei from the polymer. To enhance the thermoparticulate production of the condensation nuclei, the polymer is heated to a temperature just below that required for appreciable thermoparticulate production due to

thermal agitation alone. In the presence of carbon monoxide, thermoparticulate production of condensation nuclei is enhanced, providing a measure of the quantity of carbon monoxide present in the gaseous specimen. Previous instruments are not capable of measuring the very low concentrations found in the cleaner parts of the troposphere, and entail many problems of operation and calibration which prevent their use in areas of polluted air where possible interfering gases are present. (Author abstract modified)

22473

APTIC NO. 41006

White, E. T., R. J. Batstone, J. Day, and P. G. Wright

MODIFICATIONS TO ZEISS-ENDTER PARTICLE SIZE ANALYZER FOR DATA LOGGING. *Powder Technol. (Amsterdam)*, 5(2):127-130, 1971. 3 refs.

The measurement of particle-size distributions by a microscopic Zeiss-Endter instrument can be greatly facilitated by a modification giving a d.c. voltage output proportional to the spot size. This allows particle sizes to be logged automatically and subsequent calculations can be made without operator transcription. Additional measurements can be made on one particle, including maximum and minimum dimensions. Applications of the instrument for the measurement of size, shape, shape-size, and sphericity-size distributions are discussed.

22474

APTIC NO. 41766

Winneke, G.

METHODIC PROCEDURE FOR THE MEASUREMENT OF ODORS. (*Methodisches Vorgehen bei der Erfassung von Geruchswahrnehmungen und Geruchsbelastigungen*). Text in German. *Schriftenreihe Ver. Wasser-Boden-Luft Hyg. (Berlin)*, no. 35:15-24, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

The human sense of smelling as detector and analyzer of odors seems to be at present the only viable method for odor measurements. It has been standardized to an extent which yields reproducible results. Trained personnel are confronted with the odorous substance which has been diluted to various percentages. They just have to decide whether they can smell an odor. The degree of dilution is determined at which 50% of the personnel rendered a positive judgement. Zero-samples are mixed into the series to unvail irresponsible personnel. This method is called the statistical dilution method. In a second version of this method, the dynamic method, a flow of odorless air is mixed with an exactly-measured quantity of the odorous substance. The statistical method is more sensitive, however. An improvement of the two methods with respect to the adequate selection of personnel and reduction of the time interval between sampling and rendering a judgement on the sample is necessary.

22475

APTIC NO. 41138

Woodriff, Ray and Jerome F. Lech

DETERMINATION OF TRACE LEAD IN THE ATMOSPHERE BY FURNACE ATOMIC ABSORPTION. *Anal. Chem.*, 44(7):1323-1325, June 1972. 9 refs.

The determination of trace lead in the atmosphere can be accomplished by furnace atomic absorption. A graphite crucible is placed in a Teflon adapter and 100-500 cc of air are drawn through it using a plastic disposable syringe attached to the side arm with a piece of surgical tubing. If one is in the field, the graphite crucible can be stored in a titanium holder in a desiccator until one is able to perform the determinations. The amount of lead in the crucible is then determined by inserting it into a graphite tube furnace with an internal temperature of 1800 C and recording the absorbance. Field tests are described, which indicate that the levels of lead are consistent with observed traffic flows. The extreme sensitivity of the method of analysis combined with the sampling technique should make it valuable for spot checks as well as for deter-

mining the background levels in places where the concentrations would not be expected to be very high.

22476

APTIC NO. 40990

Yoshida, Masaaki

STUDIES IN THE PSYCHOLOGY OF OLFACTION (5). QUANTITATIVE ASPECTS OF ODOURS. (*Kyukaku no riron* (5). *Kyukaku no teiryoteki sokumen*). Text in Japanese. *Akushu no Kenkyu (Odor Research J. Japan)*, Aug. 1971. 13 refs.

The history of odor investigation, the three classic methods of sniffing, an olfactometer, and the blast injection method are discussed. Definitions of discrimination threshold, identification, and absolute threshold are given. Various scientific methods for measuring these thresholds and methods of determining an odor quantitatively are reviewed. The classical method was that the lower the threshold, the more intense the odor. More recent methods take the nature of odor and its psychological effects into consideration. Several scientists have taken various factors into formulas for measuring odors. One of the basic steps is the use of a standard material and various degrees of standard material; psychological and subjective comparisons are made of a given odor. Capryl, benzylbenzoate, n-heptanole, and metaxylene are some of the materials used as standards. Psychological factors, mixed substance factors, magnitude, adaptation factors, cross adaptation, and selectivity, are some of the factors taken into consideration by the scientists.

22477

APTIC NO. 41125

Yoshikawa, Akira

SUSPENDED PARTICULATES IN THE AIR AND ITS FILTERING. (*Taikichu fuyu jina oyobi sono toka*). Text in Japanese. *Osaka no Sora (Sky Osaka)*, no. 14:1-8, March 1972.

The suspended particulate concentration and the particle distribution in Osaka city were measured at a location which had the average values of the city, and the filtration characteristics of several types of filters were tested. Experiments were conducted from the end of 1964 to the beginning of 1965. On Dec. 11, 1964, the particulate concentration was 90 particles/ml at 2:00 am and 400 particles/ml at 12:00 pm. However, wind started to blow from noon and the concentration decreased to 800 particles/ml after 1 hour. The concentration when a typhoon struck the area was 3 particles/ml. Measurements of particle size revealed that particles larger than 1 micron were only about 1% of those smaller than 0.3 micron. Filtrations of the particulates with glass fiber showed that the thinner the glass fiber, the thicker the filter packing layer, the larger the packing rate, or the lower the wind speed was, the higher the filtering efficiency. Higher filtering efficiency could be obtained for an urethane foam filter by using urethane with smaller foam. But the pressure loss would be increased.

22478

APTIC NO. 41440

Zagorskaya, M. K., O. A. Karlova, and R. P. Varlamov

COLORIMETRIC DETERMINATION OF MERCURY IN AIR IN THE PRESENCE OF SULFUR DIOXIDE. (*Opredeleniye ртути v prisutstvii sernistogo gaza*). Text in Russian. *Zavodsk. Lab. (Moscow)*, vol. 3:539-540, 1971.

The colorimetric method of Polezhaev, which is based on the use of a reagent containing copper chloride, sodium sulfite, potassium iodide, and sodium bicarbonate, is unsatisfactory when sulfur dioxide is present in the air sample. Satisfactory results are obtained by passing the sample through a 5 cm column of AV-17 containing 15 to 20% water. The mercury is then absorbed from the purified gas in 0.1 N iodine and determined colorimetrically.

22478

22479

Zarebska-Joszt, E.

A METHOD OF OBTAINING A STANDARD DUST IN STEEL MILLS. *Air Conserv. (English translation from Polish of: Ochrona Powietrza)*, 3(1):18-31, 1969. 15 refs. NTIS: TT 70-55123/1

A safer, less expensive, more accessible method of obtaining iron oxide dust in an electric arc was used to obtain dust that would correspond in physical and chemical properties to the steel mill dust obtained in converters. The carbon electrodes contained a 50% core of carbonyl iron and 50% ceylon graphite. The binder was an alcoholic solution of phenol-formaldehyde resin of 1.09g/cc density. Oxygen was fed to the arc zone. The industrial dust samples were collected from a chimney being evaluated, from a one ton L-D converter, and from the scrubbing water of an arc furnace during puddling. The specific density, the dust size, the size distribution, the specific electrical conductivity, and the ability of the particles to undergo contact electrification were defined.

AIR QUALITY MEASUREMENTS

22480

APTIC NO. 40997

Ishikawa Prefectural Government (Japan), Dept of Environment

ISHIKAWA PREFECTURE WHITE PAPER ON PUBLIC NUISANCE. (*Ishikawa-ken kogai hakusho showa 46-nendo*). Text in Japanese. 113p., 1971.

In 1970, 370,700 kl of heavy oil were consumed in Ishikawa Prefecture. The particulate concentration in Kanazawa city was 10 to 33 tons/sq km/mo in 1966, but gradually decreased every year. However, the sulfur trioxide concentration, measured by the lead dioxide method, increased from 0.17 mg/sq km/mo to 0.37 mg/sq km/mo in 1969. Due to significant increases of automobiles, the automotive exhaust gases were becoming a major pollution problem in Kanazawa city. The carbon monoxide concentration at certain intersections was as high as 13.5 ppm, and the lead concentration at other intersections was 4.2 micrograms/cum/day. The lead dioxide method and a deposit cage were used for the measurement of sulfur oxides and particulates prior to 1970. In order to achieve high efficiencies, automatic detectors for SO₃ were used at five detecting stations, and automatic detectors for CO, hydrocarbons, and nitrogen oxides were also used.

22481

APTIC NO. 41002

CONCENTRATIONS CONTINUE DOWNWARD TRENDS. *APCD (Air Pollut. Control Dist.) Dig.*, 2(5):2-3, May 1972.

Air monitoring data collected by the Los Angeles Air Pollution Control District since 1955 indicates a downward trend in atmospheric concentrations of most air pollutants in Los Angeles County. Ozone concentrations equaled or exceeded 0.10 ppm, 1-hour average, on 333 days in 1956, as compared to 210 days in 1971. Eye irritation from photochemical smog was experienced in Los Angeles on 226 days in 1958 and declined to 125 days in 1971. Emissions from industrial sources of hydrocarbons and oxides of nitrogen have been reduced by controls required by the APCD. Control systems adopted and employed at the federal level to reduce hydrocarbons and carbon monoxide have caused nitrogen oxides to increase by 175 tons/day. It is only with 1971 models in California that automobile manufacturers have had to include controls for nitrogen oxides. Federal standards comparable with California 1971-73 standards will not be implemented until 1973 and will then be less stringent than California standards until 1976. Carbon monoxide, another important air pollutant in Los Angeles County, also has been substantially reduced.

100

AIR POLLUTION ABSTRACTS, SEPTEMBER 1972

22482

APTIC NO. 41003

Saitama Prefectural Government (Japan), Dept. of Public Welfare

REPORT ON AIR POLLUTION - SULFUR OXIDES AND SUSPENDED PARTICULATES - 1970. (*Taiki osen chosa hokokusho - jo sankabutsu, fuyu baijin o chushin toshite - showa 45 nendo*). Text in Japanese. 248p., 1971.

There were 18 detecting stations including 13 stations equipped with automatic recorders for sulfur oxides. The highest concentration of particulates was found at Kawaguchi city - 16.6 tons/sq km/mo in 1970. The highest sulfur trioxide concentration of 1.00 mg/100 sq cm/day was found at Soka city. The results of daily sulfur oxide and particulate concentrations of all the stations for 1970 were listed. More strict rules should be established to control the increasing air pollution, particularly by sulfur oxides.

22483

APTIC NO. 41043

Tokyo Metropolitan Government (Japan), Dept. of Construction and Public Nuisance

RESULT OF MEASUREMENT OF AIR POLLUTION BY AUTOMATIC RECORDER. NO. 2. JANUARY 1969-DECEMBER 1969. (*Taikiosen jidokirokukei sokutei kekka hokoku NO. 2. Showa 44-nen 1-gatsu - 12-gatsu*). Text in Japanese. 72p., March 1970.

Measurements were made from Jan. to Dec. 1969 by an automatic recorder in Ota Ward. The average concentration of sulfur dioxide tended to increase. The average concentration for a year was 0.055 ppm, which was over the environmental standard of 0.05 ppm. Compared with 0.047 ppm, the mean value for 6 months in the previous year, it was 0.052 ppm. Concentrations over 0.01 ppm appeared January-March and July-August (more than 100 times per a month) and showed a W shape in a diagram of the concentration under different months. High concentrations occurred during 8:00 am and 4:00 pm. Peak values were found during 12:00-1:00 pm, and the lowest values were found around 2:00 am. The SO₂ concentration tended to increase from Monday, showed a peak on Friday, decreased on Saturday, and was lowest on Sunday. The annual mean value of transmissivity of suspended particulates was 13.0%. Compared with 13.5%, the mean value of 6 months in the previous year, it tended to decrease and was 12.5%. Its value was higher in winter, showed a peak during December and March, and was lowest in August. Thus, the data showed a V shape in the diagram. The transmissivity was lowest during 4:00-6:00 am (14%), and showed two peaks at 7:00-10:00 am and after 4:00 pm (27% at 11:00 pm).

22484

APTIC NO. 41184

National Air Pollution Control Administration, Arlington, Va., Div. of Air quality and Emission Data

NINETEEN SIXTY-FOUR DATA TABULATIONS AND SUMMARIES. CONTINUOUS AIR MONITORING PROJECTS. NATIONAL AIR SURVEILLANCE NETWORKS. CHICAGO, CINCINNATI, PHILADELPHIA, ST. LOUIS, AND WASHINGTON, D. C. *NAPCA Pub-APTD 69-3*, 461p., May 1969.

Pollutant concentration data tables are presented for hourly averages of carbon monoxide, nitric oxide, nitrogen dioxide, sulfur dioxide, total hydrocarbons, and total oxidant, as well as two hour soiling index levels. Also presented are brief summaries of monthly means and maximums, and annual frequency distributions of data from all stations. Data from San Francisco are omitted because the site was judged to be non-representative.

AIR QUALITY MEASUREMENTS

22490

22485

APLIC NO. 41185

National Air Pollution Control Administration, Arlington, Va.,
Div. of Air Quality and Emission Data

NINETEEN SIXTY-TWO TO NINETEEN SIXTY-SEVEN
SUMMARY OF MONOTHOLY MEANS AND MAX-
IMUMS OF POLLUTANT CONCENTRATIONS. NATION-
AL AIR SURVEILLANCE NETWORKS. NAPCA
Pub-APTD 69-1, 135p., April 1969.

Daily, monthly, and annual averages of carbon monoxide, nitric oxide, nitrogen dioxide, sulfur dioxide, hydrocarbons, and total oxidants are presented for Chicago, Cincinnati, Denver, New Orleans, Philadelphia, San Francisco, St. Louis, and Washington, D. C. Continuous Air Monitoring Project stations have been in operation since 1962 in Philadelphia, W. hington, D. C., Chicago, and Cincinnati. The station originally placed in New Orleans in 1962 was moved to St. Louis in 1964. The station originally placed in San Francisco in 1962 was moved to Denver in 1965. This report brings together summaries of average and monthly pollution levels which have appeared in previous CAMP publications and covers the years 1962-1967 inclusive.

22486

APLIC NO. 41187

National Air Pollution Control Administration, Cincinnati,
Ohio, Div. of Air Quality and Emission Data

CONTINUOUS AIR MONITORING PROJECTS IN
PHILADELPHIA 1962-1965. NAPCA Pub-APTD 69-14,
369p., Aug. 1969. 13 refs.

This report presents the results of the Continuous Air Monitoring Projects in Philadelphia, Pennsylvania, operated by the Public Health Service during 1962, 1963, 1964, and 1965. Data on the atmospheric levels of carbon monoxide, nitric oxide, nitrogen dioxide, sulfur dioxide, total hydrocarbons, and total oxidants are analyzed and discussed. The data are tabulated as hourly, daily, and monthly mean concentrations. Because of significant point sources of SO₂, the SO₂ recorded is more strongly related to wind direction than are the other pollutants. Seasonal concentrations of SO₂ tend to be erratic, but tend to be higher in winter than in summer. The NO_x concentrations show pronounced diurnal variation with peaks relating to the peaks of automobile traffic. Seasonal variation in the emissions of NO_x is emphasized by their dependence of solar radiation. Both daily and seasonal variations in total oxidants depend on variations in solar energy; levels are higher in the daytime than at night and higher on summer days than on winter days. The concentrations of total hydrocarbons show little variation with season or wind direction but have a consistent diurnal variation with peaks that correspond to traffic surge. The peaks for CO also correspond to the traffic surge. The seasonal averages for the soiling index follow the pattern of heating fuel consumption. The diurnal averages follow the pattern of traffic surge.

22487

APLIC NO. 41225

National Air Pollution Control Administration, Arlington, Va.,
Div. of Air Quality and Emission Data

NINETEEN SIXTY-TWO TO NINETEEN SIXTY-THREE
DATA TABULATIONS AND SUMMARIES. CONTINU-
OUS AIR MONITORING PROJECTS. NATIONAL AIR
SURVEILLANCE NETWORKS. CHICAGO. NAPCA
Pub-APTD 69-4, 176p., May 1969.

Pollutant concentration data tables (maximum 24-hour concentration, maximum hourly average concentration, and 5-minute concentration) are presented for carbon monoxide, oxidants, nitric oxide, nitrogen dioxide, sulfur dioxide, and total hydrocarbons for 1962 and 1963. A 2-hour soiling index test was added in 1963. Also included are summaries of monthly means and averages and frequency distributions of pollutant concentrations.

22488

APLIC NO. 41554

Nagoya Municipal Office (Japan)

PRESENT STATE AND COUNTERMEASURE OF EN-
VIRONMENTAL POLLUTION. MATERIALS IN
NAGOYA CITY. (Kogai no genkyo to taisaku. Shiryō-
shu) Text in Japanese. 123p., Oct. 1972.

An investigation was performed concerning air pollution, water pollution, and noise in Nagoya city, and these results classified by areas, years, and classifications are shown in tables and graphs. Generally, air pollution was slightly improved, but sulfur dioxide was over the environmental standard. Lead quantity in automobile exhaust gases became an issue for 1970, and the mean value was 1.63-3.87 micrograms/cu m, and the highest was 5.43 micrograms/cu m. In addition, several oxidants were determined, and special care was called for a future transition of oxidant quantities. Although the state of pollution was slightly improved in 21 spots along rivers in the city, it remained great. When the measurement results were compared in terms of the whole pollution concentration grade, every spot was judged as a polluted area. Observations on the state of noise were made, and traffic noise in 70 spots of the 38 main arterial roads in the city was surveyed. Furthermore in 1962 a budget was started to promote the prevention of environmental pollution. In 1970 it amounted to \$980,000, 3 times as much as that in 1966. In 1972, an Environmental Sanitation Bureau, Department of Environmental Pollution Control was changed to a Bureau of Environmental Pollution Control, in accordance to the legal system of the nation and prefecture. Plans were made for enforcement of control and direction, checking relief measures, and establishment of comprehensive countermeasures of the prevention of environmental pollution. In 1971, the total estimate for the prevention of environmental pollution was \$980,000.

22489

APLIC NO. 41977

OSAKA ENVIRONMENTAL POLLUTION WHITE
PAPER. FISCAL YEAR 1971. (Showa 46-nendo ban,
Osaka-fu kogai hakusho) Text in Japanese. 305p., Oct.
1971.

The present conditions of environmental pollution and the policies in Osaka Prefecture are given. Air pollution has been considerably wide-spread in and around communities of Osaka and Sakai from sulfur oxides and dust emitted from industrial plants and factories and automobile exhaust gas. In addition to industrial wastewater, community sewage caused severe water pollution in streams such as the Yodogawa, Kanzakigawa, Neyagawa, and Yamatogawa. In Osaka Bay, the water quality and coastal deposit has been made worse because of these streams and pollutants from factories and ships. Noise during the night, especially in residential, business, and semi-industrial districts, has become a big problem. The frequency and influence of noise around the Osaka International Airport has been enlarged. Land subsidence has ceased almost completely in the Osaka area through the regulation of groundwater, but the ground is still sinking outside this area. Land pollution has increased to the extent that cadmium is detected in the crops from industrial waste effluents. Industrial wastes from factories, families, and garbage centers have rapidly increased, becoming extraordinarily variant in quality. Counterplans such as investigation, surveillance and control of pollution sources, consolidation of public services necessary for environmental protection, finance and support for these facilities and aid or relief for those damaged are described.

22490

APLIC NO. 41979

Ibaragi Prefecture (Japan), Environmental Pollution Research
Center

ANNUAL REPORT OF THE ENVIRONMENTAL POL-
LUTION RESEARCH CENTER OF IBARAKI-KEN NO.
3. (Ibaraki-ken kogai gijutsu senta nenpo). Text in
Japanese. 162p., Aug. 1970.

Air pollution, noise and water quality in Ibaragi are discussed. Falling dust, sulfur oxides, and meteorological observation in Hitachi and Kashima areas are given. Waste gas of factories in 16 areas of Ibaragi Prefecture and odor in Kashima area are mentioned. Automobile exhaust gases in five cities whose street traffic is comparatively heavy was measured. Dust fall near a cement factory was heavy and the concentration of sulfur dioxide in the basin of the River Miyata was as high as in the preceding year. There was a large amount of dust fall in the Kashima area. This was caused by the sand dune zone around the area and the effect of various construction works in Kashima. The amount of smoke from some factories where several complaints were reported was over the emission standard of environmental pollution control regulations in Ibaragi Prefecture. Hydrogen sulfide, ammonia, SO₂, methyl mercaptan, and hydrogen fluoride were the cause of odor. The concentration of carbon monoxide and the amount of lead in automobile exhaust was low in every area, compared with the degree of pollution in the main cities. Water quality of different rivers and drainage of factory sewage were surveyed and reported.

22491

APTIC NO. 42076

Miyagi Prefecture (Japan), Dept. of Public Health

POLLUTION DATA OF MIYAGI PREFECTURE. REPORT NO. 7 (1968.4-1969.3). (*Miyagi-ken kogai shiryō dai 7-ho* (Showa 44-nen 4-gatsu- Showa 45-nen 3-gatsu)). Text in Japanese. 339p., Sept. 1970.

In Miyagi Prefecture the number of complaints about noise has been increasing (38% of all complaints in 1969), complaints have been decreasing concerning offensive odor, smoke, soot, and dust. An investigation was made on falling smoke and dust, sulfur oxides, automobile exhaust gases, and odorous substances. The relationship with the meteorological conditions is mentioned. A survey was carried out on the water quality of rivers and cadmium pollution. A discussion was made for the polluted areas regarding cadmium pollution controls. A difference was observed in the mean value of the output of urinary Cd (10.27 micrograms/day in the polluted area, and 4.48 micrograms/day in the controls). The noises from chip and macadam factories, community traffic, and aircraft were measured.

22492

APTIC NO. 42077

Kita-Kyushu Municipal Government (Japan), Public Nuisance Control Bureau

PUBLIC NUISANCE IN KITAKYUSHU CITY: THE FISCAL 1970. VOL. 5. (*Showa 45-nendo Kitakyushu-shi no kogai dai 5-go*). Text in Japanese. 222p., Sept. 1971.

Sulfur oxide concentrations measured by an automatic recorder are a little higher than the air quality standard, while those measured by the lead dioxide method are lower than that. This may be due to the effects of configuration and unusual weather conditions. The concentrations of nitrogen oxides have not exceeded standards. The amount of dust fall was high around Dokai Bay, and had a slight tendency to decrease in other districts, except Wakamatsu district. The mean value of the amount of airborne dust at nine sampling stations in the city was 0.08 mg/cu m/hr. Most of the concentrations of carbon monoxide due to emission gases of automobiles have not reached the air quality standard during alerts. Oxidants were not measured. Water pollution is discussed. Dokai Bay is extremely polluted because it is situated in the center of the Kitakyushu Industrial Area. Investigations on noise were carried out in the Nakai district of Kokura Ward. The agreement on public nuisance prevention with enterprises, epidemiological investigations on health, and complaints and appeals are discussed.

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22493

APTIC NO. 42093

Ibaragi Prefecture (Japan)

SUMMARY OF AIR POLLUTION IN HITACHI DISTRICT AND KASHIMA DISTRICT IN 1971. (*Hitachi, Kashima chiku no taikiosen 46-nen no matome*). Text in Japanese. 14p., 1971.

The conditions of air pollution in 1971 in Hitachi district and Kashima district in Ibaragi Prefecture were compared with those in the previous year. The average amount of dust fall in 1970 was 9.50 tons/sq km/mo in the Hitachi district, and 9.45 tons/sq km/mo. in the Kashima district, and that of 1971 increased to 9.77 tons/sq km/mo in the Hitachi district, and 11.9 tons/sq km/mo in the Kashima district. The concentration at different measurement points in September in the Hitachi district decreased to 1/3 of that of 1966. The average amount of sulfur dioxide in 1970 measured by the lead dioxide method was 0.64 mg/100 sq m/day in the Hitachi district, and 0.14 mg/100 sq m/day in the Kashima district, and that of 1971 was 0.56 mg/100 sq m/day in the Hitachi district, and 0.21 mg/100 sq m/day in the Kashima district respectively. Although an increase was observed in the Kashima district, it was not definitely air pollution, considering the value. The average concentration of SO₂ by conductometry in 1971 was 0.29 ppm in the Hitachi district, and 0.017 ppm in the Kashima district, which were below the environmental standard. Furthermore, isopleths delineating concentrations of SO₂ and dust fall in both districts are illustrated by graphs.

22494

APTIC NO. 42095

Tokyo Metropolitan Government (Japan), Dept. of Construction and Environmental Protection

REPORT OF INVESTIGATION ON AIR POLLUTION IN OTA WARD (A LIMITED AREA). (*Ota-ku taikiosen kyokuchi chosa*). Text in Japanese 80p., March, 1972.

An investigation of air pollution in limited areas of Ota Ward was carried out in cooperation with scientists in order to obtain useful data on the counter-measures for air pollution producing sources. The distribution of pollution depends upon the producing sources and the meteorological conditions; it changes due to the yearly and seasonal situations. The ward was partitioned into a total of 41 areas, then each area had a measurement point. Since the determination was made six times/day, on the 10th day of every month, the yearly number of measurements reached 3024. The hourly average of sulfur dioxide and carbon monoxide was determined. The velocity by an anemometer at three spots recorded the direction of wind and the atmospheric temperature. Sulfur oxides were reduced to half, compared with the 1970 fiscal year. The weekly average was lower than usual on Saturdays and Sundays and higher on Tuesdays and Thursdays. The mean values of CO which were the same degree as the concentration of pollution on the 1970 year, were reduced in the amount of variation. In autumn and winter, the values rose from 8 am to 10 am; on the other hand, in summer and spring, it fell from 8 am to 10 am. Especially in November and December, it rose rapidly from 2 pm to 6 pm. Both SO₂ and CO have been increasing.

22495

APTIC NO. 42097

Yamaguchi Prefecture (Japan), Dept. of Hygiene

REPORT ON MEASUREMENT RESULTS AT NATIONAL AIR POLLUTION MONITORING NETWORK, UBE STATION, FISCAL YEAR 1969. (*Kokusetsu taikiosen sokuteimo Ube sokuteijo sokutei kekka hokokusho*). Text in Japanese. 209p., April 1970.

The measurement results at the national air pollution monitoring network station in Ube are reported. This station was initiated by the Ministry of Health and Welfare in June 1968 to observe the condition of air pollution from a nationwide point of view. The main purposes of this network are to know the range (distribution throughout the country) and the state of air pollution, to obtain basic data for establishing environmental

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standards, and to promote air pollution measurement in local districts. Measurement was carried out about sulfur oxides, wind direction and velocity, temperature, and humidity. Equipment used includes automatic recording systems for sulfur dioxide and nitrogen oxides, a recording wind vane, a thermograph, and a hygograph. A high volume air sampler (with a shelter) was employed for collecting pollutants and a computer for observation data processing. Daily and hourly measurement results from April 1969 through March 1970 are shown in the tables.

22496

APTIC NO. 42120

Takaishi Municipal Office (Japan), Section of Public Nuisance
PRESENT STATE AND COUNTERMEASURES OF POLLUTION IN TAKAISHI CITY. (*Takaishi-shi no kogai no genkyo to taisaku. Showa 46-nen 10-gatsu*). Text in Japanese. 57p., Oct. 1971.

The investigation of environmental pollution in Takaishi City, which is located in southern part of Osaka Prefecture, was carried out continuously from 1966 through 1970. As a result of the investigation of air pollution, it was found that although the annual value of each kind of measurements showed little change, the concentration of carbon monoxide, nitrogen oxides, and lead amount showed high values in the districts influenced by heavy traffic or development of the neighboring industrial areas. A questionnaire to inhabitants showed that the number of complaints from respiratory diseases caused by air pollution was increasing. Three rivers running through the city and water along Osaka Bay were polluted. The noise was higher than the environmental standard of 40 dB (A) in many measuring spots, especially facing roadways. Furthermore, the responses made by 26 environmental pollution monitors in the city indicated that stream pollution and offensive odors were becoming acute. The sewage drain system should be completed and drainage from factories should be always inspected. Countermeasures against noise in factories was also needed. In addition, it was recognized that establishment of facilities and systems for analysis and inspection was in need.

22497

APTIC NO. 42122

Ministry of Health and Welfare (Japan); Fukuoka Prefectural Office (Japan); and Kumamoto Prefectural Office (Japan)
RESULTS OF INVESTIGATION ON ENVIRONMENTAL AIR IN FUKUOKA PREFECTURE, KUMAMOTO PREFECTURE, OMUTA CITY, AND ARAO CITY. March 1970. (*Fukuoka-ken, Kumamoto-ken Omuta-Arao-chiku kankyo taiki chosa kekka*). Text in Japanese. 106p., 1970.

Measurements of air pollution (levels of sulfur dioxide, suspended particulate matter, and component analyses) and meteorological observations (wind direction and velocity, temperature, and humidity) were made at five spots during Nov. 17-25 in 1969. Results of measurements were recorded and summarized. The results of density measurements of sulfur oxides (at 20 spots) by means of colorimetry and electric conductivity were indicated by day and hour. The suspended particulate matter was collected by a hi-vol air sampler (at 10 spots). The component analyses were made concerning organic substances (amounts extracted by benzene), water-soluble substances (pH, sulfate, and nitrate) and metals (beryllium, copper, vanadium, chromium, manganese, iron, cobalt, nickel, zinc, lead, cadmium, and titanium) by atomic absorption fluorospectrometry. The results of density measurements are given by day and hour and those of component analyses are given by day. Meteorological observations including general weather condition and wind direction and velocity measured by day and hour at each spot were indicated. Factories producing soot and smoke and conditions of fuel use during the observation periods were given from Nov. 18-24. Further, conditions of air pollution (dust, SO₂) at the main observation spots and conditions of occurrence of accidents during 1966 to 1968 were shown. These observations were made in various cities in Fukuoka and Kumamoto Prefectures including Arao and Omuta.

APTIC NO. 42123

22498

Industrial Public Nuisance Council, Tokyo (Japan)

REPORTS ON COMPREHENSIVE PRELIMINARY INVESTIGATION ON INDUSTRIAL PUBLIC HAZARDS. (*Sangyo Kogai sogo jizen chosa hokokushu*). Text in Japanese. 50p., April 1970.

In 1972 the following districts will be studied: Goi and Anegasaki districts in Chiba Prefecture, southern Nagoya and Higashi Mikawa districts in Aichi Prefecture, Kawasaki and Yokohama district, Mizushima district in Okayama Prefecture, Osaka and Amagasaki districts, and Kashima district in Ibaragi Prefecture. Guidance was given for enterprises concerning the forecast and prevention of atmospheric pollution using three methods of a field investigation, a diffusion test with a wind tunnel, and calculation of diffusion by theoretical formula. Water pollution is discussed. Air quality measurements in Japan are discussed, and data is given on wind, sulfur dioxide, meteorology, and diffusion.

22499

APTIC NO. 41577

Arai, Shoji, Manabu Muramatsu, Yukio Kakizaki, Masakatsu Kurashima, Toshio Uehara, Nobukazu Endo, Kazuyoshi Hashimoto, Mikio Araki, Ryutaro Ishida, Masato Miura, Keiichi Honma, Kozo Takeuchi, Shigeo Okamoto, Atsuo Emoto, Atsuyoshi Nakao, Tadao Yokota, Jinko Suzuki, Satoru Koyama, Masaru Saito, and Takashi Nakahira

ON THE RESULT OF ESTIMATION OF AIR ENVIRONMENT IN UNDERGROUND SHOPPING CENTER. (*Chikagai ni okeru kuki kankyo no sokutei kekka ni suite*). Text in Japanese. Tokyo-to Eisei-kyoku Gakkai-shi (Rept. Tokyo Public Health Studies), no. 48:26-27, Nov. 1971.

The ventilation, temperature, relative humidity, and concentrations of carbon monoxide, carbon dioxide, and airborne dust were measured in shops and passages in underground shopping centers in the summer season. The temperature in tenant areas, at 4 out of 15 points, was unsatisfactory according to the environmental sanitation standard value. The temperature in passages was 1-3 C higher than that in the tenant part. Relative humidity in tenant areas was unacceptable at 11 out of 157 points in Tokyo station A and B underground shopping centers and Shinjuku station B underground shopping centers; humidity was within 35-79%. Concentration of CO at Shinjuku station, even above the ground, was less than 10 ppm. At the Tokyo station it was 31 ppm above ground and 27 ppm underground. Airborne dust was unqualified in the tenant areas of the Tokyo station underground shopping center in the passages of Shinjuku station underground shopping centers. Concentrations of CO₂ exceeded 0.10% in some sections.

22500

APTIC NO. 41155

Daido, S., H. Uno, and K. Tsuchida

A STUDY ON THE PARTICLE SIZE DISTRIBUTION OF SUSPENDED PARTICULATES IN THE AIR. NO. 3. CHEMICAL ANALYSIS OF COMPONENTS. (*Taikichu no fuyu haijin ryudo bunpu ni kansuru kenkyu (3) kagaku bunsekiho ni yoru fuyu haijin to respirable dust no seibun ni suite*). Text in Japanese. Taiki Osen kenkyu (J. Japan Soc. Air Pollution), 4(1):33, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Basic studies for suspended particulate particle size distribution, composition, and components were conducted. The total suspended particulates were measured by an ordinary hi-volume air sampler. Both were based on a 24-hour continuous collection. Particle weight distribution was measured by a cascade impactor. Soluble elements in suspended particulates and respirable dust were analyzed by the ordinary wet chemical method and metal elements were measured by spectrophotometry and the atomic absorption method. The test material was captured on the roof of the Chiba Prefectural Environmental Protection Research Inst. The result expressed by 50% mass median measurements were a 1.9 to 5.4 micron dis-

tribution, and the mean figure was 3.9 micron. The ratio of respirable dust to the total suspended particulates was approximately 25 to 50%, the mean figure was 37%. The relationship between suspended particulates and respirable dust with regard to sulfur oxides ranged from 24 to 91%, and the proportion of sulfur oxides in respirable dust increased as SO_x in the total suspended particulates increased.

22501

APTIC NO. 42108

Ettinger, Harry J. and George W. Royer

VISIBILITY AND MASS CONCENTRATION IN A NONURBAN ENVIRONMENT. *J. Air Pollution Control Assoc.*, 22(2):108-111, Feb. 1972. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 1971, Paper 71-81.)

An air sampling program was conducted in a nonurban, low pollution area to relate total particulate mass concentration measured with a high-volume sampler, particulate mass size distribution measured with aerodynamic size selective samplers, and visual range measured by the integrating nephelometer. For low suspended particulate mass concentrations, a relationship between visual range and mass concentration is presented. The relationship is compared to similar relationships developed for urban, high pollution areas, and reasonable agreement exists. Short duration pollution peaks due to local traffic were identified by the integrating nephelometer. Particle size analyses obtained over long time periods using the Andersen impactor and cascade centripeter show varying mass median size, but generally follow similar size distributions. Because of the sampling time scale, particle size could not be related to visual range. (Author abstract modified)

22502

APTIC NO. 41948

Gucho, E., J. Cornillon, J. P. Bernard, and R. Touraine

MOULD ALLERGY. RESEARCH INTO MICROMYCETES IN THE ATMOSPHERE OF THE LYONS AREA. (A propos de l'allergie aux moisissures. Recherche sur les micromycètes de l'atmosphère Lyonnaise). *Text in French. Rev. Franc. Allergol.*, 12(1):3-20, 1972. 16 refs.

The fungal content of the atmosphere around Lyons was measured in 1968 and 1969 by the culture method for identification of the fungi and the slide method for spores not grown in the laboratory. In the summer *Cladosporium*, *Alternaria*, and *Ascomycetes* predominated with *Epicoecum* and *Basidiomycetes* in the fall; no month was completely free of mycological pollution in the atmosphere. Fungi which grew only with difficulty in cultures but which fructified readily on host plants were the strictly seasonal *Peronosporales*, some of the *Ascomycetes* (*Helvella* and *Erysiphe*), all the *Sclerobasidiomycetes* (*Ustilago*, *Tilletia*, *Urocystis*, *Puccinia*, *Uromyces*), and some Fungi imperfecti (*Polythrincium*, *Monotropa*). Year-round fungi whose counts fluctuated only slightly with the weather included *Penicillium*, *Botrytis*, *Fusarium*, and *Sphaeropoidales*. Fungi identified sporadically included the non-seasonal *Mucor*, *Rhizopus*, *Puccinomyces*, *Scopulariopsis*, and *Chaetomium*, which as a rule do not act as dangerous allergens. Among the rare fungi, were identified *Laccellina*, *Laccellinopsis*, *Fusella*, *Diplodia*, and *Dichomera*. In the center of Lyons the overall spore count on slides was 4732 in June, 8027 in July, 3763 in August, 43 in December and 161 in January.

22503

APTIC NO. 40150

Hammje K., W. Raub, and C. Shiller

CONTINUOUS SULFUR DIOXIDE MEASUREMENTS IN HALLE-NEUSTADT. (*Kontinuierliche Schwefeldioxid-Messungen in Halle-Neustadt*). *Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(4):235-238, April 1972. 7 refs.

Halle-Neustadt, the largest homogeneous residential area of the German Democratic Republic, is heated by remote heat

supply only. The atmospheric sulfur dioxide concentration was measured for a period of one year. An automatic recording measurement was used. The measurement principle was based on the photometric determination of the purple color developing from the reaction of the sulfur dioxide with formaldehyde and pararosaniline in a hydrochloric acid solution. The measuring station was on the second floor of a five-floor apartment house in the South of Halle-Neustadt. The 24-hour values obtained for the period April 1969 to March 1970 reveal that the maximum allowable emission concentration long-term tolerance limit was exceeded on 85 of the 343 days (24.8% of the time). In December and January, diurnal averages of more than 0.50 mg/cu m occurred. January also had the highest monthly average of 0.38 mg SO₂/cu m. The influence of the industries located in the south-eastern direction and the city of Halle in the East shows in the individual values which were sometimes higher than 1 mg SO₂/cu m. The wind direction had a marked effect on the SO₂ concentrations.

22504

APTIC NO. 41156

Ito, M. and H. Yoda

MEASUREMENT OF ATMOSPHERIC HYDROCARBONS BY GAS CHROMATOGRAPHY. - HYDROCARBONS IN PETROLEUM INDUSTRIAL COMPLEX. REPORT NO. 1. (*Gasu kuromatogurafu ni yoru taikichu no taika suiso no sokutei - sekiyu konbinato chitai ni okeru tanka suiso, daiippo*). *Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):42, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Measurements of hydrocarbons in the air were taken at the Ichihara Coastal Industrial area in order to obtain a pattern of air pollution. Materials were sampled at three points, on an industrial highway where traffic is heavy and often causes a jam, near the petroleum refining factory, and at a commercial residential area of Ichihara. Water and carbon monoxide were eliminated from the sampled air and gas chromatography was applied for analysis. As a result, a total of 17 elements from C3 to C5 were analyzed. They included: propane, propylene, isobutane, n-butane, sis-2 butene, n-pentane, 3-methyl-1-butene, 1,3,7- butadiene, 1-pentene, 2-methyl-1-butene, trans-2-pentene, sis-2 pentene, 2-methyl pentene, and n-hexane. Four or five more elements of hexane were separated, but identifications were unknown. In the air taken at the petroleum refinery area, 14 elements were detected, but the low boiling point HCs which are usually found in a petroleum refining emission were not found. Eleven elements were found in the air from the industrial highway. These two locations showed similar patterns, but isopentane was found more in the factory area. The material from the factory area also showed a similar pattern to the air taken at the commercial-residential area. None of the three locations showed a uniquely characteristic pattern. The air in the commercial-residential area showed a different pattern at night, with less HC and only eight elements.

22505

APTIC NO. 41615

Kovatsis, Anastasios and Dimitris Koufides

SULFUR DIOXIDE AIR POLLUTION AND SOME OBSERVATIONS OF THE THESSALONIKI ATMOSPHERE. *Text in Greek. Chem. Chron. Genike Ekdo-sis*, 36(10):216-223, 1971. 48 refs.

Measurements were carried out with the Analyser Ultragas U35 apparatus of Woesthoff at various points along the main street of Thessaloniki, Greece. The study covered a three-month winter period from November 1970 to February 1971 when pollution levels are at a maximum due to gas emissions from central heating systems. The medium concentration of sulfur dioxide for the period was 36.1/ micrograms/cu m. The highest observed concentration was 78 micrograms/cu m. Concentrations at different parts of the street differed according to level of automobile traffic and draught. High humidity caused

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high SO₂ concentrations, but no correlation was found between temperature and SO₂ concentrations.

22506

APTIC NO. 41534

Lammanen, Arvo

AREAL EVALUATION OF SULFATES IN DUSTFALL, RAINFALL ACIDITY AND NEEDLE INJURY. *Work Environ. Health*, 9(1):26-39, 1972. 12 refs.

The percentage of sulfate in dust fall of four Finnish cities and one rural area suggests that the proportion of water soluble sulfates has recently increased. The results were: Lappeenranta, 6.1%; Helsinki, 6.5%; Oulu, 7.2%; Kokkola, 10.0%; and Pertunmaa, 22.0%. The fact that pH and sulfate values, in general, correlate positively with particulate sulfates and areal needle injuries indicates that the sulfur problem in some Finnish urban atmospheres is important. The significance of this type of air pollution for soil management is difficult to evaluate because of the heterogeneity of soils, their great buffering capacity, and the probable large buffering capacity of dust fall itself. (Author abstract modified)

22507

APTIC NO. 41745

Lammanen, Arvo

FUNCTIONS, PROGRESS AND PROSPECTS FOR AN ENVIRONMENTAL SUBARCTIC BASE LEVEL STATION. *Work Environ. Health*, 9(1):17-25, 1972.

A base level station undertaking air, water, and sediment studies in Pertunmaa, central Finland, is described and plans for the future are summarized. The ultimate functions of base level monitoring are connected with the development of biomedical criteria for environmental standards. Suspended particulates, total dust fall, trace elements, and seasonal considerations are indicated for 1970-1971, as well as preliminary results from a trace element survey of lake and well water. (Author abstract modified)

22508

APTIC NO. 40964

Laktionov, A. G.

CONTENT OF MATTER SOLUBLE IN WATER IN ATMOSPHERIC AEROSOL PARTICLES. (*Soderzhaniye rastvorimykh v vode veshchestv v chastitsakh atmosfery*) *Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana*, 8(4):389-395, 1972. 7 refs.

An equation is derived which allows one to calculate the average content of water soluble matter in particles according to the known sizes of dry particles and drops which had grown there when the relative humidity of the air was 100%. In 1967 through 1970 some aircraft investigations of water soluble matter in dry particles with radius from 0.16 to 0.4 micron were carried out. More than 1/4 of the total mass of the dry particles of 0.16 micron was water soluble. As particle size increases, the amount of water soluble matter decreases. The content of water soluble matter is proportional to surface area. Within the layer of 4 to 5 km altitude, the relative content of water soluble matter is 1.5 to 2 less than that measured within the layer 0.1 to 1.5 km high. The relative content of water soluble matter is less in summer than in winter.

22509

APTIC NO. 41664

Laxskog, Anders

ORGANIC LEAD COMPOUNDS IN AUTOMOTIVE EXHAUSTS AND IN STREET AIR. (*Organiska blyföreningar i bilavgas och gatuluft*) *Text in Swedish. Stockholm Univ., Inst. of Analytical Chemistry, TPM-BIL-64*, 84p., Jan. 1971. 20 refs.

The organic lead compounds analyzed were tetraalkyl lead compounds; among them tetramethyl lead, TML, and tetraethyl lead, TEL, have occurred most frequently and are often the only ones present. The method of analysis that has been developed is based upon enrichment of gas samples,

separation in a gas chromatograph, and detection with a mass spectrometer. The time required for sampling is short, 10-15 min for street air and between 5 sec and 1 min for automobile exhaust gases. The TML and TEL are analyzed separated from each other and from other organic lead compounds, and the sensitivity of the method is high, 10 ng/cu m of air. Analyses of automobile exhaust gases have shown that the amount of TML and TEL varies between 5 and 5000 micrograms/cu m of exhaust gas and that this difference seems to depend on the working temperature of the motor, with higher quantities found at lower temperatures. Analyses of street air has shown that the quantity of TML and TEL varies between 0.02 and 2 micrograms/cu m of air. The 24-hour average values of about 0.25 micrograms/cu m have been measured in major streets in Stockholm in Nov. and Dec. 1969. Very weak correlation between the occurrence of tetraalkyl lead and other pollutants in street air has been found, but the density of traffic gives better correlation to tetraalkyl lead. (Author abstract)

22510

APTIC NO. 41520

Morlin, Zoltan and Magdolna Kertesz Saringer

DETERMINATION OF SMALL AMOUNTS OF LEAD IN CITY AIR AND IN DUST SEDIMENTS. (*Vizsgálatok Kis mennyiségű ólomtartozásokról meghatározására a városi szabad levegőben és szedimentált porban*) *Text in Hungarian. Egészségtudomány*, 15(4):389-395, 1971. 10 refs.

The lead content in atmospheric air and settled particulates was determined by quartz emission spectrography. Samples taken at nine locations in Budapest showed 0.2 to 5.0 micrograms of Pb/cu m in the atmosphere, and 1-10 milligrams of Pb/g in settled dust from roadway samples. The daily standard is 0.7 micrograms/cu m in the air. Only the samples taken in traffic free areas of Budapest are under this standard.

22511

APTIC NO. 41975

Nagata, Tomoko, Tomio Kono, Kunihiko Akino, Kinji

Nakano, Toshio Ohira, and Hiroshi Yamazaki

AIR POLLUTION IN TOKYO BY METALS. (*Tokuyotoni no jikinzo kuosen ni tsuite*) *Text in Japanese. Tokyo to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.)*, 3(3):3-10, 1972. 9 refs.

Continuous sampling for 24 hours by a high volume air sampler was carried out every 10 days during Aug. 1968 to March 1970 and every 12 days during May 1970 and March 1971. Differences between the observed values by year and area were compared and ratio of the concentration of each metal to the total amount of dust and soot were calculated. Metal content in suspended particulate matter was affected by pollution sources of industries. Concentration of iron, manganese, lead, cadmium, and chromium were related to the total amount of dust and soot. Pollution by these metals will be reduced by the control of dust and soot. However, control of pollution by such metal as copper, concentrations of which varied by place, will be more difficult.

22512

APTIC NO. 41652

Nakano, K. and T. Odaira

CONSIDERATIONS ON CARBON MONOXIDE CONCENTRATIONS IN CROSSROADS, ENVIRONS. In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Environmental Protection Research Inst. (Japan)*, p. 10-20, 1971.

Twenty air sampling points were placed at various crossroads in Tokyo, Japan: four points on the sidewalk by the side of a building at the four corners of a crossroads, eight points on the sidewalk by the side of a building at a distance of 100 m from the four corners of a crossroads, four points at a distance of 50 m from either of the two roads which crossed with each other, and four points at a distance of 100 m from either of the two roads which crossed with each other. Samples were taken for six 1-hour periods each day. Good results

were acquired in the correlation analyses among the mean values of the carbon monoxide concentration at the four corners of a crossroad, those at the points by the roads at a distance from the crossroads, and those at some distances from the roads, and it is thought that the pollution in the surrounding area may be estimated from the mean value of the data at the four corners of a crossroads. The heterogeneous pollution of the atmosphere at a crossroads was shown by the fact that the measurement at one corner of a crossroads gave dissatisfying results. The heterogeneous pollution might be caused by meteorological conditions, traffic characteristics, and the construction of a crossroads. Thus the limitation of an area to be surveyed should particularly be taken into consideration when the degree of pollution is evaluated against the Environmental Standard. Also the relation between the traffic amount and the CO concentration cannot be grasped sufficiently by measurement only in the daytime.

22513

APTIC NO. 41470

Parker, J.

POLLUTION FROM AIRPORTS. HEATHROW 1970-71.

Preprint, National Society for Clean Air, London (England), 33p., 1971. 9 refs. (Presented at the National Society for Clean Air Conference, Folkestone, England, Nov. 1971.)

Air pollution was measured at Heathrow Airport to determine the contribution of the airport and its operations to the air pollution in the neighboring urban areas. The investigation was divided into two parts to determine pollution characteristics during the summer period when air traffic is at its maximum and urban pollution is at its minimum, and during the winter period when air traffic is at its minimum and urban pollution is at its maximum. Measurements were made of smoke, sulfur dioxide, nitrogen oxides, carbon monoxide, and total hydrocarbons. Continuous measurement of smoke at two sites at the perimeter of the airport gave mean figures of 31 and 24 micrograms/cu m for the summer and 22 and 34 micrograms/cu m for the winter. Background concentrations for NOx even close to the runway, were similar to or lower than those in central London. The maximum value for total hydrocarbons was 3.5 ppm. The highest mean values for CO and total hydrocarbons were determined in the road network in the central area with maximum values of 50 and 4.4 ppm, respectively. From the results of observations from different sources at Heathrow, the highest values came from road traffic and taxiing aircraft. Approximately 45% of the aircraft pollution emitted occurred during permission for take-off. It was concluded, therefore, that pollution from aircraft movements does not contribute significantly to local pollution.

22514

APTIC NO. 41033

Repetto, M. and M. Menendez

ATMOSPHERIC POLLUTION IN SEVILLE, 1970-1971.

(La polución atmosférica en Sevilla, 1970-71). Text in Spanish. Rev. San. Hig. Pub., 45(10):921-954, 1971.

A study carried out in Seville between May 1970 and May 1971 deals with the atmospheric pollution rates. Urban pollution from ammonia, lead, zinc and smoke is important. Ammonia sources are fertilizer plants located in the main part of the town, motor vehicles and domestic heating. In studying pollution rates, reduction of motorized traffic in the center of the town is considered because traffic had been forbidden since the previous winter. It accounts for diminution of carbon monoxide rates. Sedimentable matter contains a high percentage of lead and zinc. The lead source seems to be tetraethyl lead from cars. Lead and zinc values correlated. Maximum rates of lead/sq m were 1.5 mg at Republica Argentina Avenue and 2.00 mg at Velazquez Street.

22515

APTIC NO. 41164

Seki, Toshihiko, Hidehiko Hoshikawa, Mono Suzuki, Tadashi Sugano

INVESTIGATION AND STUDY OF AIR POLLUTION REPORT 5. AMOUNTS OF FLOATING SOOT AND DUST COLLECTED WITH HI VOLUME AIR SAMPLER IN SENDAI CITY. (Taikiosen ni kansuru Chishinai no fuyu baijin ryo ni tsuite). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:112-118, 1971.

Measurements of floating soot and dust amounts were performed on the roof of a building in Sendai in 1966 and 1967. In 1967, a comparison between amounts during nights and days was made: 8 hr in daytime and 7 hr at night, for a total of 57 days. The monthly average value was 0.117-0.429 mg/cu m (yearly, 0.269) in daytime and 0.220-0.587 mg/cu m monthly at night (yearly, 0.348), 1.3 times the daytime value. Collection for 24 hr was done in 1967 for a total of 84 days, representing a 0.151-0.424 mg/cu m monthly average (yearly, 0.247) and winter amounts were 1.9 times those of summer. Tar content rate of floating soot and dust was 1.9% in the daytime and 30.5% at night on a yearly average, indicating that the amount at night increased to 1.6 times the daytime value. Collection for 24 hr gave a 23.1% yearly average, representing a winter amount 1.9 times the summer amount. The hi-volume air sampler method is the best way to measure amounts of floating soot and dust at present; however, since the specification of measurements hasn't been prescribed yet and the duration and number of measurements are varied, there is a large difference among each value according to the investigation method. Therefore, in order to research amounts of floating soot and dust, it is necessary to choose the measuring methods carefully.

22516

APTIC NO. 41167

Suzuki, K., A. Nishidate, and S. Izumi

AN INVESTIGATION AND STUDIES ON THE STATE OF POLLUTION AND COUNTERMEASURES IN AOMORI. (Aomoriken ni okeru kogi no jittai to taisaku ni kansuru chosa kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):2, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

With the construction starting in about 1965 of numerous new industries in addition to the previous marine product industrial, Hachinoe City, Aomori Prefecture foresaw an increase of various types of pollution including odor, soot, stack gas, noise, and vibration. The new construction included 404 plants for food industries, two chemical factories, 26 ceramics plants, 20 steel factories, 33 plants for metal manufacturing and fabrication, 26 plants for non-ferrous metallurgy, and 16 paper-pulp mills. Aomori Prefecture and the city of Hachinoe had cooperated on control and prevention plans and on establishing standards and enforcement plans, since 1965. In June 1965, six air pollution monitoring stations were installed and four more were added in September 1968. Settling particles are measured by deposit gauges; sulfur dioxide by the lead dioxide and para-rosanilin methods and automatic measuring recorders; suspended particulates by hi-volume air samplers, digital dust counters, tape air samplers, and automatic measurement recorders; and wind direction and velocity by automatic self-recording anemometers. Soot measurements shows that between 1965 and 1968, the index increased from 6.2 tons/sq km to 8.4 tons, 11.2 tons, and finally 10.8 tons. Sulfur dioxide measurement was 0.22 mg/day/sq cm in 1965, 0.35 mg in 1966; 0.48 mg in 1967, and 0.37 in 1968. Industrial areas and adjacent areas showed the highest measurements.

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APTIC NO. 41164

Tate, M., H. Ose, S. Morishita, Y. Wataya, H. Inoue, and T. Hayakawa

AIR POLLUTION IN OGAKI CITY. (*Ogakihi no taiki osen*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan Soc. Air Pollution), 4(1):6, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

In June 1967, automatic measurement equipment and self-recording anemometers were installed in Ogaki city and continuous automatic monitoring of air pollution was started. Fluctuations of sulfur dioxide and nitrogen dioxide were measured by alkaline filter papers at 25 locations and the results were compared with measurements which had been taken at eight locations in the city since 1964. There was no notable seasonal difference in the measurements of SO₂, but NO₂ counts were low in summer and high in winter. There average for 25 locations was 0.52 mg SO₃/day/100 sq cm for Oct. 1966 to Sept. 1967; 0.43 for Oct. 1967 to Sept. 1968; and 0.47 for Oct. 1968 to June 1969. The effects of an SO₂ control system installed in Aug. 1967 and a hydrogen sulfide control system installed in Dec. showed in the measurements of the following year. But two years later, concentrations showed a tendency to increase again. Daily fluctuation was observed at four points in the industrial area and center city, where SO₂ was measured by the Rosanilin and formaline methods and H₂S was measured by the methylene blue method. The results indicate that locally Ogaki has some high concentration but in general its air pollution problem is less serious in some other cities.

22518

APTIC NO. 41223

Werczberger, Elia and Gail Howrigan

COMPUTER MAPPING AS AN AID IN AIR POLLUTION STUDIES. VOLUME II. INDIVIDUAL REPORTS. REPORT D. KANSAS CITY REGION STUDY. Harvard Univ., Cambridge, Mass., Graduate School of Design, National Air Pollution Control Administration Demonstration Grant 68A-2405D. Rept. APTD-0779, 112p., April 1970. 3 refs.

NTIS: PB 204179

The report of an individual case study of the Kansas City Region is presented. Technical aspects of the mapping discussed include formulation and estimation of background values; evaluation and manipulation of surfaces on a cell by cell basis; and mapping of information implicit in measurements of air quality data. The maps produced in the study illustrate the following: demographic data, air quality data, pollutant emission density, correlation between demographic data such as social and economic phenomena, correlation between different air quality criteria, correlation between socio-economic data and emission density, correlation between emission density and air quality, and the relationship between air pollution and population. Annual and daily averages are mapped for suspended particulates; monthly averages for sulfation and dust fall are given. Four technical appendices are included in addition to the appendix of computer graphics: alternative methods for extrapolating air quality data to the periphery of the study area; use of the GRID program for the correlation of maps produced by SYMAP; applications of the Larsen Model; and the GRID program.

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APTIC NO. 41972

Japan Meteorological Assoc. (Japan)

METEOROLOGICAL OBSERVATION IN FUJI DISTRICT IN SHIZUOKA PREFECTURE. (*Fuji-chiku kisho chosa hokokusho*). Text in Japanese. 36p., Feb. 1970.

For the purpose of the countermeasure of air pollution in Fuji District, climatic conditions, vertical distributions of temperature, wind direction, wind velocity, and changes in air current were observed by a non-lift balloon in Fuji City, Shizuoka Prefecture, during Jan. 23 to 27, 1970. During the period of observation it was winter type and the air was stable. A sea breeze and land breeze were significantly observed. Wind direction turned at 9-10 am and 18-20 pm. Upper limit of sea breeze was 200-300 m from the ground. Wind speed was stronger in a sea breeze in daytime than in a land breeze. Insolation was 50 g cal/cm/hr, maximum. An inversion layer was found at 6 pm and 7 am, and wind direction and velocity at this time were north or northwest and 2 m/sec-3 m/sec, respectively within 200 m from the ground.

22520

APTIC NO. 42015

SULFUR POLLUTION ACROSS NATIONAL BOUNDARIES. (*Schwefelverunreinigung ueber Landesgrenzen*). Text in German. *Umwelt* (Duesseldorf), 2(3):70-71, June/July 1972.

A Swedish study group published the results of an examination concerning the expansion of sulfur emissions over large areas. About 75% of the sulfur emitted into the air over North-Western Europe is a result of human activities. Belgium, France, Germany, Netherlands, and Luxembourg emitted 3.7 million t/yr, Great Britain and Ireland 3.1 million t/yr, Scandinavia 0.6 million t/yr, and the Eastern European countries 1 million t/yr. These emissions expand over several countries and remain for some days in the atmosphere before being precipitated by rains in the form of harmful sulfuric acid. Sulfur dioxide concentrations of more than 0.05 ppm/mo are harmful for human beings, while plants can be damaged by concentrations exceeding 0.02 ppm/mo. While the influence of high sulfur concentrations on human health have already been sufficiently investigated, the influence of low concentrations for longer periods have not yet been tested. The problem of sulfur emissions can only be solved by an intensive international cooperation.

22521

APTIC NO. 41511

Aleksandrov, E. L.

ON THE ORIGIN OF ATMOSPHERIC AEROSOLS. (*O proiskhozhdenii atmosferykh aerolei*). Text in Russian. *Tr. Inst. Eksp. Meteorol.*, no. 20:72-83, 1971. 47 refs.

Studies on the origin of atmospheric aerosols are reviewed, and a new method for the quantitative evaluation of the continental component in such aerosols and in precipitations is presented. The method is based on a comparison of non-volatile contents (sodium, potassium, and calcium) in aerosol and precipitation samples to respective contents in soils and sea water. The chemical composition of the soil was fairly homogeneous. The sodium to potassium ratio was 2:3, while the calcium contents showed certain variations. A formula for the determination of the continental component in atmospheric aerosols is given. Chemical composition and continental component of different precipitation, air, cloud water, and dew samples were determined. The continental component varied from 6 to 100%, and values below 50% were observed along coastlines only. The share of the continental component in precipitation increased with both altitude and distance of oceans. The lack of correlation between the continental component and the amount of precipitation may be due to the participation in precipitation formation of different aerosols, as well as to variations in the chemical composition of the precipitation as a result of the washout of low-layer aerosols.

22522

APTIC NO. 41752

Bapseres, P. and J. Molenat

POLLUTANT DISPERSION AND MICROCLIMATE AT THE LACQ GAS FIELD. (*Dispersion des polluants et microclimat a Lacq*). Text in French. *Ann. Mines* (Paris), no. 11:21-30, Nov. 1970.

A meteorological forecasting system for pollution-caused damages to agricultural plants around the Lacq natural gas processing plant is described. The natural gas, containing 15.3% of hydrogen sulfide, 9.3% of carbon dioxide, and 0.3% of mercaptan, is desulfurized by means of ethanolamine according to the Claus method, the yearly sulfur production being some 1.4 million tons. The cleaned residual gases contain 0.0005% of H₂S, 0.6% of SO₂, and 10% of CO₂ when released to the atmosphere at a rate of 10 million cu m/day. As the emissions, particularly of SO₂, had caused damages to the nearby agricultural area, continuous SO₂ monitoring was applied. However, the plant damages were in direct correlation with specific meteorological conditions rather than with SO₂ concentrations. Investigations of the microclimate (measurements of temperature, humidity, wind speed and direction, precipitation and solar radiation) revealed that the meteorological conditions favored the formation of stagnation and high humidity. The factors required for damages to occur were found to be specific meteorological conditions during three previous days, and on the day of the damage (thick fog, total or almost total stagnation, inversion of isothermal temperature conditions). The daily forecasts contain data on the degree of hazards, fog probability for the following night and morning, as well as existence and direction of air currents. Whenever the coincidence of meteorological conditions favoring damages is forecasted, production is reduced to minimize pollution.

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APTIC NO. 41087

Bartlett, J. T. and P. R. Jonas

ON THE DISPERSION OF THE SIZES OF DROPLETS GROWING BY CONDENSATION IN TURBULENT CLOUDS. *Quart. J. Roy. Meteorol. Soc. (London)*, 98 (415):150-164, Jan. 1972. 28 refs.

The effect of turbulence within a cloud on the distribution of the sizes of droplets growing by condensation was examined in some detail with the aid of a scheme for simulating a fluctuating updraught numerically. Contrary to the conclusions previously reached by some Russian and Chinese workers, the spread in the radii of droplets at any given level which this mechanism produces is very small, generally less than 0.2 micron. Other factors which may account for the observed distributions of droplet sizes were considered, and the most important appear to be mixing between a cloud and its environment and the variable composition of condensation nuclei. Absorption of organic surface active substances on to some condensation nuclei probably accounts for the existence of small droplets in the interiors of well-developed clouds. (Author summary modified)

22524

APTIC NO. 42117

Becker, K. H., W. Groth, and U. Schurath

REACTIONS OF O₂(1-DELTA-G) WITH OZONE. *Chem. Phys. Letters (Amsterdam)*, 14(4):489-492, June 15, 1972. 20 refs.

The rate of the reaction: O₂(1-Delta-g) + O₃ yields 2O₂(3-Sigma-g negative) + O(3P), was measured in a static reactor between 296 and 360 K. The decay of O₂(1-Delta-g) was determined from the emission of O₂(1-Sigma-g positive) at 7620 Å. The rate constant is 6.0 times 10 to the negative 11th power exp(-5670/RT) cu cm/molecule/sec. The reaction of O(3P) with ozone produces O₂(1-Sigma-g positive) with approximately 0.01% efficiency. (Author abstract modified)

22525

APTIC NO. 41916

Beckwith, W. Boynton

FUTURE PATTERNS OF AIRCRAFT OPERATIONS AND FUEL BURNOUTS WITH REMARKS ON CONTRAIL FORMATION OVER THE UNITED STATES. *Preprint, American Meteorological Society, Boston, Mass., Sp., 1972. 12 refs. (Presented at the International Conference on Aerospace and Astronautical Meteorology, Washington, D. C., May 22-26, 1972.)*

The increased turbine fuel demand rate has been revised downward from 13% to 5%, but consumption is still expected to rise from 25.6 billion gal/yr for 1972 to 1975 to 69.4 billion gal/yr for 1981 through 1985. Fuel consumption/passenger mile is expected to drop over that same interval from 0.063 gal to 0.043 gal. These estimates take into account the introduction of a limited number of supersonic transports. Fuel burning in the stratosphere is seasonal due to the seasonal drop in the altitude of the tropopause during the winter and early spring. The author observed 395 contrails over a period of eight yrs on 204 individual flights. Aircraft producing no visible contrails were observed 37% of the time. Contrails persisting less than 5 min were observed 37% of the time. Contrails persisting for more than 5 min were observed 25% of the time. Contrails persisting for more than 50 mile are not common. Contrails have been observed above the tropopause when no contrails were observed below it. Persistent contrails tend to form in or near natural cirrus decks, in advance of cirrus clouds associated with changing synoptic patterns, or in the lee of major mountain barriers as an accompaniment of weak mountain wave action. Some natural cloud formations resemble contrails.

22526

APTIC NO. 41288

Bowne, Norman E.

SPACE AND TIME VARIABILITY OF SO₂ AND PARTICULATE CONCENTRATIONS IN CONNECTICUT. *TRC, the Research Corporation of New England, Hartford, Conn., National Environmental Research Center Contract CPA 70-155, 63p., Sept. 1971. 5 refs.*

NTIS: PB 206823

Two-hour and 24-hour sulfur dioxide and 24-hour particulate values obtained at 30 locations in Connecticut on 25 sampling days during the winter of 1967-1968 were analyzed to determine the space and time variability of air quality. In addition, a comparison was made between observed SO₂ concentrations in four areas and concentrations estimated by the TRC regional model and the Air Quality Display model. The observed pollutant concentrations had a log-normal distribution that represented the frequency distribution quite well. Slopes of the log-normal distribution were near two for urban areas but steeper in suburban and rural areas. The diurnal variation of concentration was consistent with both atmospheric stability changes and emission curves. The spatial variability of SO₂ was a function of source pattern, distance from the source, and time period of sampling. In or near urban areas there is a high degree of spatial variability in both instantaneous and short-time averaged air quality measurements. If the sources are diverse enough, the long-term average concentration and frequency distributions may be affected by sampling location. The 2-hour SO₂ concentrations estimated by the TRC regional model were lower than the observed concentrations, while those estimated by the Air Quality Display model were larger than observed. Modeling for both short and long-term concentration estimates can be performed, but it is clear that good source inventory is required.

22527

APTIC NO. 41607

Bushtuyeva, K. A., M. D. Manita, and S. A. Akhmedova

ATMOSPHERIC OZONE STANDARDIZATION APPROACHES IN INHABITED AREAS. (*O podkhodakh k normirovaniyu ozona v atmosfere vozdukh naselennykh mest*). Text in Russian. *Gigiena i Sanit.*, 37(5):6-9, July 1972. 12 refs.

The poor validity of the conventional approach in establishing maximum allowable concentration figures for ozone in polluted urban areas is pointed out. Air quality measurements were made in two cities of the Azerbaydzhan SSR with predominant petroleum refining industries, heavy traffic, and high ultraviolet radiation exposure. The data were compared to measurements performed in a clean air area on the seashore. Since actual ozone concentrations in the clean air area were higher than in the air-polluted areas, the main hazard of ozone

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should be viewed in its role as an intermediate in producing further pollutants from its photochemical reactions with hydrocarbons and nitrogen oxides. Therefore, the ratio between the amount of hydrocarbons including other oxidants and the amount of ozone should constitute the valid criterion for the hygienic evaluation of ozone in polluted areas. This ratio increases with the concentration in photochemical reactant pollutants such as hydrocarbons and nitrogen oxides. Further data obtained by unified analytical methods are needed to establish actual standard maximum allowable concentrations figures.

22528

APTIC NO. 41459

Calder, Kenneth L.

SOME APPLICATIONS OF GENERALIZED SIMILARITY ANALYSIS TO THE THEORY OF ATMOSPHERIC DIFFUSION AND EVAPORATION. *Preprint*, 23p., 1971. 3 refs. (Presented at the Symposium on Air Pollution, Turbulence, and Diffusion, Las Cruces, N. Mex., Dec. 7-9, 1971.)

A mathematical transformation technique leads to a sharp result and requires a universal relationship between only three combinations of problem parameters when applied to the steady-state problem of diffusion from a continuously emitting point source. In addition to the three dimensional point source problem, the two-dimensional problem of a continuously emitting crosswind line source is also considered as well as the problem of evaporation of volatile liquid from a crosswind oriented strip at ground level. Some formula parameters include wind direction and velocity, transport, plume behavior, and boundary conditions. In both cases more information is obtained using the transformational technique than through the use of ordinary dimensional analysis. (Author abstract modified)

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APTIC NO. 41658

Calder, Kenneth L.

SOME MISCELLANEOUS ASPECTS OF CURRENT URBAN POLLUTION MODELS. *Public Health Service, National Air Pollution Control Administration and North Carolina Consortium on Air Pollution, Proc. Symp. Multiple-Source Urban Diffusion Models*, Chapel Hill, N. C., 1969, p. 4-1 to 4-13. 21 refs.

GPO

The basic structure of many current urban pollution models is examined from the point of view of underlying assumptions and physical basis. Initial attempts to extend steady-state models to variable conditions and long-term predictions are indicated, with a brief discussion of stochastic simulation of the concentration patterns and average seasonal and annual distributions. In view of the complexity of most computer-oriented models, a sensitivity analysis is recommended to identify the input parameters that most critically affect the concentration predictions. (Author abstract)

22530

APTIC NO. 41676

Calder, Kenneth L.

ABSORPTION OF AMMONIA FROM ATMOSPHERIC PLUMES BY NATURAL WATER SURFACES. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Meteorology*, 11p., 1970 (1. 5 refs.

A simple model is presented that incorporates the major features of atmospheric transport and diffusion of an ammonia plume together with aqueous absorption as the plume traverses a water surface. The mass rate of surface removal of material per unit area and per unit time is taken to be directly proportional to the local concentration value. The magnitude of the removal or absorption process at the surface is specified by the proportionality factors, or deposition velocity. Derivation of the necessary equations is described. A specific application

of the model to the gas release from an ammonia stripper of a hypothetical sewage treatment plant is considered, and it is concluded that ammonia absorption by adjacent water masses could be considerable.

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APTIC NO. 42050

Carver, J. H., B. H. Horton, R. S. O'Brien, and Bryan Rofe
OZONE DETERMINATIONS BY LUNAR ROCKET PHOTOMETRY. *Planetary Space Sci.*, 20(2):217-223, Feb. 1972. 13 refs.

Atmospheric ozone number densities were determined over the altitude range from 30-75 km by measuring the absorption of the lunar ultraviolet radiation in a number of wavelength bands between 2400-2900 Å. The measurements were made from rockets fired at night at times close to full moon and show significant variations in ozone densities particularly at the higher altitudes. Comparison with other observations indicates that above 60 km the ozone densities at night are markedly greater than they are during the day. (Author abstract modified)

22532

APTIC NO. 42057

Clough, W. S. and J. A. Garland

THE BEHAVIOUR IN THE ATMOSPHERE OF THE AEROSOL FROM A SODIUM FIRE. *J. Nucl. Energy*, vol. 25:425-435, 1971. 10 refs.

The chemical form of sodium released from a fast reactor into the atmosphere from accidental conditions is predicted. The reaction of sodium with oxygen, water vapor, and carbon dioxide is discussed, and calculations are made of both the final chemical state of sodium and the rate and formation of the stable compounds. The size of the aerosols formed is shown to be a function of chemical form and relative humidity, and the effect of each is demonstrated in representative calculations. The reaction of sodium with other constituents of the atmosphere modifies the residence time and the deposition characteristics of the resulting sodium aerosol. (Author abstract modified)

22533

APTIC NO. 41183

Conley, L. A., E. J. Croke, A. S. Kennedy, R. F. King, J. E. Norco, J. J. Roberts, A. D. Rossin, and T. D. Wolsko

ISOPLETH-AREA TABLES. *Argonne National Lab. Ill., Center for Environmental Studies, Atomic Energy Commission Contract W-31-109-Eng-38*, 308p., Oct. 1971. 12 refs.

NTIS: ANL/ES-8

The tables included provide the dimensions of ground-level isopleths of pollutant concentration downwind of a single stack that is emitting a continuous plume of emissions. For any reasonable set of meteorological conditions (wind speed, temperature, atmospheric stability, and mixing layer depth) a table gives the parameters of isopleths as functions of the height of the stack and emission rate. A number of examples are presented to illustrate the use of the tables and specific applications. The theory used to develop the isopleths is explained and discussions are included on the limitations of the tables with regard to accuracy and applications. A listing of the computer program is appended. Effective stack height for sulfur dioxide emissions are discussed.

22534

APTIC NO. 41942

Dalu, G. and G. A. Dalu

AN EXPERIMENTAL CHECK ON THE REMOVAL OF RADON. *J. Aerosol Sci.*, 2(2):241-246, June 1971. 8 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

The half-life of radon is 3.8 days, long enough to permit vertical distribution to 100 m by diffusion alone. Because radon gas

is a noble gas, it is felt that it is not removed from the atmosphere by the processes which usually capture the solid daughter products. Experiments in the past suggested that a partial removal of radon from the atmosphere occurs by wash-out. To test this, direct measurements were made of radon concentration in an isolated environment which was enriched with this gas and in which fog was produced artificially. Similar measurements were also made in the presence of a high potential gradient. From these experiments, it has been established that the only process which eliminates radon from the atmosphere is the radioactive decay of the radon itself. (Author abstract modified)

22535

APTIC NO. 41761

Demerjian, Kenneth L., J. Alistair Kerr, and Jack G. Calvert

THE RELATIVE IMPORTANCE OF THE VARIOUS INTERMEDIATE SPECIES IN OLEFIN REMOVAL REACTIONS IN PHOTOCHEMICAL SMOG. *Environ. Letters*, 3(3):137-149, 1972. 10 refs. (Presented at the Symposium on Air Pollution and Its Problems, Annual, 25th, Louisiana State Univ., Jan. 10-13, 1972.)

Computer simulations have been made of the chemical changes which occur in smog chamber experiments using nitric oxide/nitrogen dioxide/trans-2-butene/air mixtures. The results indicate that significant differences are expected between experiments conducted with steady illumination and with periods of illumination punctuated with long dark periods. The olefin, ozone, nitrogen oxides concentration-time profiles are altered appreciably by using the alternative irradiation techniques. When proper account is taken of the effect, and excellent match is made between the present computer simulation and experimental studies in which a light-dark period cycle was used. The computer simulation of this system with steady illumination provides a basis for judging the relative importance toward olefin attack of the various reactive intermediates in this system. The species O(3P), ozone, and hydroxide seem to be important during some stage of the olefin-NO_x photooxidation sequence. The radicals HO₂ and CH₃O are probably important; NO₃ radicals seem less important; and singlet oxygen seems to be an unimportant reactant with olefins in these systems. (Author abstract modified)

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APTIC NO. 41939

Derjaguin, B. V., Iu. S. Kurghin, L. A. Rosenzweig, and V. A. Fedoseyev

STUDY OF PASSIVATION OF CONDENSATION GROWTH OF DROPS OF WATER AND SALT SOLUTIONS. *J. Aerosol Sci.*, 2(2):261-274, June 1971. 5 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

Success in retarding the growth of mist drops until the sun warms the surface layers of the atmosphere could forestall the formation of radiation mist. Calculations based on the properties of water and salt mists and cetyl alcohol vapor were corroborated by laboratory experiment and field testing. Drops of sodium chloride solution of an initial radius on the order of 150 microns had retarded growth rates when coated with a monolayer of cetyl alcohol at solution concentrations up to 10%, corresponding to supersaturations of water vapor up to 7%. At high supersaturations, cetyl alcohol exerts a retarding effect only at the very beginning, and then the drop grows as rapidly as in the absence of cetyl alcohol. The critical supersaturation of water vapor proved to be 7%. Experiments with two micron droplets produced the same 7% limit. The slope of experimental growth curves shows good agreement with calculated values, if the coefficient of condensation is assumed to be 3.5 times 10 to the minus 5th power. Field tests showed considerable modification of mists with cetyl alcohol.

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APTIC NO. 41469

Derwent, R. G.

THE RELATIONSHIP BETWEEN CHIMNEY HEIGHT AND THE EXTENT OF OXIDATION OF NO TO NO₂ IN THE PLUME. *Warren Spring Lab., Stevenage (England)*, LR 159(AP), 12p., Oct. 1971. 16 refs.

The relationship between chimney height and nitric oxide oxidation in the plume was examined. The reaction of NO with ozone was suggested as the route by which NO is oxidized to nitrogen dioxide in urban atmospheres. In combination with a simple model for horizontal diffusion, this reaction mechanism was determined consistent with the ambient levels found in polluted atmospheres. The same approach was then applied to the dispersal of pollutants from chimneys, concluding that there is no mechanism by which ozone can be transported into a plume to oxidize sufficient NO for the NO:NO₂ ratio to be dependent on chimney height. At the concentration levels expected in chimney effluents, there is not enough ozone to produce significant conversion of NO to NO₂. Ground level ratios of NO:NO₂ are, therefore, independent of chimney height. 0

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APTIC NO. 41553

Duetsch, H. U.

PHOTOCHEMISTRY OF ATMOSPHERIC OZONE. *Adv. Geophys.*, vol. 15:219-322, 1971. 138 refs.

A review is presented that covers the principal topics in the photochemistry of ozone. The total amount and vertical distribution of O₃ and the accuracy of the measurements is discussed. Ozone photochemistry is discussed both as classical theory and as it may pertain to a moist atmosphere. The possible importance of nitrogen oxides to O₃ photochemistry is outlined. Ozone is discussed as a tracer for circulation studies and the interrelation of ozone photochemistry and stratospheric dynamics is emphasized.

22539

APTIC NO. 41915

Ehhalt, D. H.

THE RESIDENCE TIME OF WATER AND AEROSOLS IN THE TROPOSPHERE AND LOWER ATMOSPHERE. *Preprint, American Meteorological Society, Boston, Mass.*, 18p., 1972. 6 refs. (Presented at the International Conference of Aerospace and Astronautical Meteorology, Washington D. C., May 22-26, 1972.)

The ultimate sink for materials injected into the atmosphere is the surface of the earth. On the average it takes about a month for aerosols and water vapor to be transported from the tropopause to the earth. The present estimate of residence time in the lower stratosphere is a few months. The average for the entire stratosphere is 1.6 yr. The turnover time for a given substance is obtained by dividing the total precipitable amount of a tracer in a system by the average flux of that tracer through the system. Most water cycles through the lower troposphere in 10 days. The residence time is determined by dividing the total precipitable rainfall by the actual precipitation. Tritiated water (HTO), a constituent of radioactive debris, is introduced to the lower stratosphere from the upper stratosphere each spring. During this time, the tropopause acts as a plane source for HTO and the earth acts as a sink. The vertical distribution of HTO over Scottsbluff, Nebraska in the winter and spring of 1966 indicates that, in the steady state and for the long-term average, vertical wind transport is negligible. Precipitation and downward diffusion maintain downward transport. An average residence time of about 28 days is thought to hold for HTO introduced at the tropopause in the middle latitudes. It is hoped that more research of this type will determine the role and residence times of aerosols and water vapor emitted by commercial aircraft. The residence time of 137 cesium is thought to be about 30 days.

22540

APTIC NO. 42008

Fischer, William H. and G. E. Sturdy

THE CONTRIBUTION OF A CITY TO ATMOSPHERIC TURBIDITY AND THE TURBIDITY BACKGROUND.

Atmos. Environ., 5(7):561-563, July 1971. 7 refs.

Turbidity measurements made with Volz sunphotometers from two observation stations near Boulder, Colorado indicate that a small, lightly industrialized city can contribute 25 to 40% of the total turbidity measured, and that background turbidity does exist. The Volz sunphotometer with 500 nm filters responds to light scattered by particles with radii between 100 and 1000 nm. The data and geography of a station location leads to the conclusion that the turbidity differences observed arise from measuring the contribution of the city at different times of the day at two stations. In the morning, the station east of the city views the sun through clean rural air and the station south of the city views the sun through a portion of dirty urban air. In the afternoon, the situation is reversed. Afternoon readings tend to be higher at the same solar elevation angles on the same day due to the increase of turbidity from natural and man-made causes. The turbidity results from particle concentrations averaging 3.5 to 10.5 times 10 to the 6th power/sq cm in the morning and afternoon, respectively, superimposed on a background average of 11.5 times 10 to the 6th power/sq cm, morning and afternoon. Background varies from 1.5 to 25 times 10 to the 6th power/sq cm., when converted to aerosol mass concentrations, this averages about 11 micrograms/cu m, a value twice that of Pacific coastal measurements.

22541

APTIC NO. 41468

Fisher, D. W., A. W. Gambell, G. E. Likens, and F. H. Bormann

ATMOSPHERIC CONTRIBUTIONS TO WATER QUALITY OF STREAMS IN THE HUBBARD BROOK EXPERIMENTAL FOREST, NEW HAMPSHIRE.

Water Resour. Res., 4(5):1115-1126, Oct. 1968. 15 refs.

The balances of input in the atmospheric precipitation and discharge in streams were determined for selected mineral constituents of sulfate, ammonium, nitrate, silica, aluminum, and bicarbonate in three small tributaries to Hubbard Brook in New Hampshire. Inputs and discharge of sulfate, ammonium, and nitrate were calculated from hydrologic data, together with chemical analyses of weekly samples of precipitation to determine content of sodium, potassium, calcium, magnesium, chloride, and hydrogen ion and of streamwater samples taken over a two-year period. Precipitation provided most of the 30-50 kg/hectare/yr of sulfate carried by the stream; inputs exceeded outflows of ammonium and nitrate. Maximum effluent nitrate concentrations of 2 mg/l were determined in the spring. Based on measurements of pH, the hydrogen ion was established as a major cation in precipitation over the area. Annual stream loads of silica ranged within 20-40 kg/hectare. Effluent bicarbonate and silica concentrations varied directly with each other and inversely with aluminum. (Author abstract modified)

22542

APTIC NO. 41639

Fortak, Heinz G.

NUMERICAL SIMULATION OF TEMPORAL AND SPATIAL DISTRIBUTIONS OF URBAN AIR POLLUTION CONCENTRATION. Public Health Service, National Air Pollution Control Administration and North Carolina Consortium on Air Pollution, Proc. Symp. Multiple-Source Urban Diffusion Models, Chapel Hill, N. C., 1969, p. 9-1 to 9-34. 20 refs.

GPO

A multiple-source diffusion model for the simulation and prediction of long-term, climatological ground-level sulfur dioxide concentrations in urban areas is described. The computer input consists of data from an emission source inventory together

with statistics on relevant diffusion parameters. The meteorological input consists of data on wind direction, wind-speed, and Pasquill-Turner stability classes. These parameters are assumed to be spatially homogeneous throughout the metropolitan area. Low-level emissions (residential) are correlated with low-level windspeeds and Pasquill-Gifford diffusion parameters, whereas high-level emissions are correlated with extrapolated windspeeds and Brookhaven diffusion parameters. The program also uses corresponding statistics for urban boundary layer depths and values for parameters affecting absorption at the earth's surface. The diffusion model used is basically Gaussian. The rate of decay of sulfur dioxide is taken into account, as well as the experimentally determined absorption at the earth's surface. The model calculates fields of steady-state ground-level concentrations that correspond to a given spatial distribution of emission sources and to any possible combination of relevant meteorological diffusion parameters. Knowledge of frequency distributions of these meteorological diffusion parameters permits the derivation of frequency distributions of ground-level concentrations for any location within or outside of the metropolitan area. The computerized experiments simulate frequency distributions of ground-level concentrations for a great number of regularly arranged grid points and for a variety of time periods: months, heating period, seasons, and year. Experiments to validate the model were conducted during the heating period in 1967-68 at four continuous monitoring stations that had been installed at special locations within the limits of the metropolitan area of Bremen. During the sampling period, the assumption of a sufficiently homogeneous wind field was validated by wind measurements at the same locations. The calculated frequency distributions of half-hourly mean values of concentrations generally agreed fairly well with those derived from observed values. Comparison, however, shows that the model does not simulate ground-level concentration fields in the vicinity of industrialized areas very well, because uncontrollable low-level emissions from industrial plants could not be taken into account in the diffusion model. (Author abstract modified)

22543

APTIC NO. 41753

Furukawa, K. and E. A. Ogryzlo

QUENCHING OF O₂ (ONE-DELTA-g) BY ORGANIC MOLECULES. *Chem. Phys. Letters (Amsterdam)*, 12(2):370-372, Dec. 15, 1971. 9 refs.

Rate constants for the one-delta-g state of oxygen have been investigated because of their importance in the photochemistry of a polluted atmosphere. Rate constants reported have varied by as much as two orders of magnitude because the use of the mercuric oxide method for O₂ removal does not reduce the O₂ concentration to a low enough level. Quenching by 2,3-dimethyl-2-butene (DMB) and triethylamine (TEA) when a very small amount of nitrogen dioxide is added to the stream, eliminates both the scatter and the pressure dependence of the rate constant. In the case of DMB, a value of 750,000 l/mole-sec was obtained, and TEA yields a value of 2,500,000 l/mole-sec.

22544

APTIC NO. 42129

Gamau, Minoru, Susumu Yamamoto, and Nagayuki Yokoyama

MEASUREMENT OF AIR TURBULENCE BY AIRPLANES. (*Hikoko no yoru taiki ranryu no sokutei*). Text in Japanese. Preprint, p. 105-112, July 1972. 2 refs. (Presented at the Public Nuisance Resources Research Institute Research Seminar, Tokyo, Japan, 1972.)

The distribution of dusts and smokes from high stacks are highly dependent upon the turbulence at the level of 1-2 km from the ground level. This paper presents the results of a study in a flat area and an area with complex geographical features in Japan. The analytical method for this study was: standard deviation of turbulence, energy spectrum of turbulence, energy dispersion rate by molecular viscosity, and perpendicular turbulence dispersion index.

22545

APTIC NO. 41018

Girs, S. P.

THE ACTION OF THE ELECTRIC CHARACTERISTICS OF THE ATMOSPHERE ON THE INITIAL STAGE OF CONVECTION CLOUD CHARGING. (*Vliyaniye elektricheskikh kharakteristik atmosfery na nachal nuyu stadiyu zaryazheniya konvektivnykh oblakov*). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 262:179-184, 1971. 6 refs.

Parameters determining cloud microstructure and formation as well as the electric characteristics of the atmosphere at the moment of the cloud formation were calculated to determine the charge density acting upon the particles of small-drop convective clouds as a function of the electric characteristics of the atmosphere. Studies of the effect of the initial conductivity and air charge density on the first stage of small-drop convective cloud charging indicated that, depending on the initial electric conductivity of the atmosphere, the cloud may possess unipolar and dipole charge alike. A conductivity of 0.0003/sec caused negative charge, while a conductivity of 0.0006/sec caused dipole charge of the cloud. High initial charges produced high negative charges on the cloud droplets with the initial air conductivity being the same. Varying the initial value of the unipolarity coefficient from 0.9 to 2.0 caused a shift from unipolar negative to unipolar positive charge across a positive dipole structure in the character of the cloud charge.

22546

APTIC NO. 41017

Golikov, V. I.

ON THE POSSIBILITIES OF ATMOSPHERIC OPTIC STABILITY STUDIES FROM TOTAL OZONE OR OTHER SELECTIVELY ABSORBING GAS LEVELS.

(*O vozmozhnostyakh kontrolya za opticheskoy stabilnostyu atmosfery pri izmereniyakh obshchego soderzhaniya ozona ili drugikh selektivno pogloshchayushchikh gazov*). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 255:99-105, 1970. 15 refs.

The possibility of eliminating the atmospheric aerosol background in total selectively absorbing gas level determinations by directly measuring the dispersed sky radiation were studied, as well as the application of atmospheric optic stability criteria which take into account the inconstancy of the aureole. The difficulty involved in the use of ozone measuring instruments with final spectral and angular selectivity lies in the fact that Ruger's equation for total ozone is only valid if the spectral flow is monochromatic and free from the effect of the aureole radiation, and if the attenuation by the aerosol is negligible. However, the metastable state of the aerosol background may be considerably disturbed, which requires determination of the aerosol correction during total ozone measurement, and the objective evaluation of the atmospheric optic stability. This is possible by direct measurement of the sky radiation dispersion. An aureole ozone measuring instrument as well as the features of total selectively absorbing gas measurements with variable aperture are described. This instrument was derived from an aureole photometer. The ultraviolet transparency variations obtained with the instrument are converted into equivalent ozone thickness. The quantitative determining characteristics of the atmospheric optic stability are the relative aureole, the effective dispersion factor for the aureole as well as the spectral coefficient of the atmospheric transparency. Limits, trends, and sense of the variations of the transparency coefficient can be determined.

22547

APTIC NO. 41165

Haertel, O.

POSSIBILITIES FOR SEPARATING SIMULTANEOUSLY ACTING SMOKE DAMAGE SOURCES. (*Ueber Moeglichkeiten der Trennung mehrerer gleichzeitig einwirkender Rauchschadensquellen*). Text in German. Mitt. Forst. Bundesvers., no. 73:57-68, 1966. (Presented at the Symposium on Smoke Damage to Forests in Austria, Vienna, Austria, Nov. 9-11, 1965.)

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Various possibilities for separating simultaneously-acting emission sources are outlined with special regard to sulfur dioxide. The separation requires at least one of the characteristics to be different for the respective sources. For sources emitting the same pollutant, separation is based on dilution phenomena. With great distances between sources, the stack gas emissions are partially superposed. Separation is difficult for short distances, while great differences in source heights make the separation easier. In the latter case, the concentration profiles are superposed. However, the effect of height differences is eliminated by turbulence with distances exceeding 5-6 km. Two sources close to each other can also be separated if their emissions show different variations as a function of time, the respective dilution factors being the same. Most often, the emission sources lie in different directions relative to the emission point investigated. Here, the frequencies of different winds should be taken into account. A Swedish instrument that includes a weather vane and a one-way valve admitting air into a recipient in the wind direction only is referred to. The separation should never be based on a single criterion, since emission represents one of the factors involved, only. Barite impregnated tissues were used in all separations and a comparison of the results with data obtained by means of other methods showed fairly good accordance.

22548

APTIC NO. 41146

Hamming, W. J.

PREDICTED LEVELS OF OXIDES OF NITROGEN IN PHOTOCHEMICAL SMOG IN 1980 (TEN YEARS).

Preprint, Air Pollution Control Assoc., Pittsburgh Pa., 11p., 1970. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Oct. 1970.)

The importance of nitrogen oxides, tonnage emission figures in 1980, and the possibility of nitrogen oxides control were discussed. The photochemical effects such as eye irritation, ozone concentration, and visibility reduction will be improved. Nitrogen dioxide concentrations are expected to be below the 0.25 ppm standard, provided the auto industry meets the 1974 nitrogen oxide standards. This would put the solution to the summer photochemical smog on the West Coast on the way with only an occasional day of eye irritation, ozone below 35 ppm, and nitrogen dioxide below 1/6 ppm. This will improve as time goes on after 1980. However, in the winter in the southern part of Los Angeles County, the NO₂ concentration may exceed the State standard of 0.25 ppm/hr, even with stationary source control, especially if the auto control is only partial.

22549

APTIC NO. 42138

Harries, J. E. and P. A. R. Ade

THE HIGH RESOLUTION MILLIMETRE WAVELENGTH SPECTRUM OF THE ATMOSPHERE.

Infrared Phys., 12(2):81-94, 1972. 26 refs.

New measurements are presented which have been made of the spectrum of solar radiation attenuated by the atmosphere of the earth and observed from sea level with the 1.5 m diameter telescope at Queen Mary College. The experimental system consists of a phase modulated Michelson interferometer and a Rollin detector. Spectra have been obtained to a resolution of 0.125/cm, with very high signal-to-noise ratios. As well as clear observation of the well-known water and oxygen lines, a number of weak features are detected, some for the first time. The nature of these weak lines, particularly those at 7.7/cm and 8.8/cm is discussed; the most favorable assignment for the latter still being to the water dimer molecule (H₂O). Some consideration is given as to how these observations might be used to obtain quantitative meteorological measurements, and particular attention is drawn to a method whereby the ratio of spectral power at a pair of suitably chosen wavelengths may yield information about the composition of the atmosphere without requiring a knowledge of absolute absorption coefficients. (Author abstract modified)

22550

APTIC NO. 41639

Hoidale, G. and N. Johnson

VARIATIONS IN GIANT PARTICLE CONCENTRATIONS NEAR AN INTERIOR DESERT BASIN. *Z. Meteorol.*, 22(11/12):372-376, 1971. 14 refs.

Number concentrations of giant particles were continuously monitored at a site located about 1300 m above the eastern edge of the Tularosa Basin of south central New Mexico, over a two-week period in late March 1969. The background concentration of 0.1 reciprocal cu cm was associated with particles from the free atmosphere over the desert basin to the west of the sampling site, while the lowest concentrations of 0.01 reciprocal cu cm were related to snow scavenging and the highest concentrations of 10 reciprocal cu cm to strong winds near the surface of the basin. The effect of frontal passage was dependent on the magnitude of the prefrontal concentrations and on the history of the influxing air mass.

22551

APTIC NO. 41943

Huertas, M. L., A. M. Marty, J. Fontan, I. Alet, and G. Duffa. MEASUREMENT OF MOBILITY AND MASS OF ATMOSPHERIC IONS. *J. Aerosol Sci.*, 2(2):145-150, June 1971. 10 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

The evolution in atmospheric air of small radioactive or gaseous ions has been studied for ionic ages ranging from .00001 second to a few seconds. Small air ions are mainly formed by water molecules clustering around atomic ions. The water may be replaced by molecules or radicals. The definite relationship between ionic mass and mobility could not be determined within the experimental configuration. Different mobility values were found for different ionic age ions. When gaseous impurities are present, the evolution of negative ions is slower than that of positive ions and seems to be continuous beyond 1 sec.

22552

APTIC NO. 41521

Ilso, S. B.

RADIATION FLUXES DURING A DUST STORM. *Weather (London)*, 27(5): 204-208, May 1972. 5 refs.

Total solar radiation, both direct and diffuse; atmospheric thermal radiation; and air temperature were measured during a severe dust storm. The ratio of diffuse radiation to direct solar radiation was 4.7 times greater during the dust storm than on a normal cloudless day. The mean decrease in total transmittance (the ratio of measured total radiation to that available at the top of the atmosphere) was only 22%. This effect, if persisting throughout the daylight hour would decrease solar radiation 91 cal/sq cm. On the other hand, atmospheric thermal radiation would have been increased 90 cal/sq cm. Because of the persistence of long-wave flux throughout a 24-hour period, the total net effect over 24 hrs would be a net increase of 38 cal/sq cm or 2.6%. These results indicate that the total effect of persistent particulates at the concentration of the dust storm particulates could tend to warm the earth. Thermal radiation would more than make up for the lost solar radiation.

22553

APTIC NO. 41974

Ito, Mashashi, Saburo Fukuoka, and Toshio Ohira

CONDITION ON MEASUREMENT OF LOCAL WIND IN URBAN DISTRICT. (*Toshi ni okeru kyokusho no soku-tei ni taisuru kosatsu*). Text in Japanese. Tokyo to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), 3(3):27-32, 1972. 7 refs.

Wind characteristics and turbulent flow in closely built-up areas were observed by sonic anemometer, and performance of various kinds of anemometers was compared. Results of observation by three kinds of anemometers (sonic, cup, and propeller types) agreed under the condition of 2 m/sec wind

velocity. But when the wind velocity was below 1 m/sec, cup and propeller anemometers were inadequate for measurement. In urban districts, wind velocity and wind direction were quite different at each measuring place. Stagnation in air flow occurred on the leeward of buildings. In a light wind, small eddies took part in the changes of wind velocity.

22554

APTIC NO. 41463

Johnson, Warren B.

LIDAR MEASUREMENTS OF PLUME DIFFUSION AND AEROSOL STRUCTURE. Preprint, American Meteorological Society, Boston, Mass. and Air Pollution Control Assoc., Pittsburgh, Pa., p. 55-61, 1971. 11 refs. (Presented at the Conference on Air Pollution Meteorology, Raleigh, N. C., April 5-9, 1971.)

Observational programs of lidar measurements of smoke plumes from the 245-meter stacks of a coal-burning power plant and measurements of the urban haze layer over San Jose, California were conducted in May and December of 1970, respectively. For the plume study, mobile lidar was situated at any one of a number of preselected sites, depending upon the orientation of the plume. At each site, vertical cross sections through the plume were normally obtained at several downwind distances from the stack. The technique consisted of scanning vertically, generally with elevation angle increments of one degree, and repeating for other azimuth angle. The observations for the urban pollution layer study were obtained as elevation scans similar to those used for the plume study; non scanning stationary operation with the lidar pointed vertically and firing at fixed increments of time; and non-scanning mobile operation with the lidar firing at fixed increments of distance by means of an odometer control. Illustrative lidar representations relating to the qualitative aspects of plume structure and behavior and of aerosol layer structure and to the quantitative locations and dimensions of the plume and aerosol (urban haze) layers are included.

22555

APTIC NO. 41660

Johnson, Warren B., F. L. Ludwig, and Albert E. Moon

DEVELOPMENT OF A PRACTICAL, MULTIPURPOSE URBAN DIFFUSION MODEL FOR CARBON MONOXIDE. Public Health Service, National Air Pollution Control Administration and North Carolina Consortium on Air Pollution. Proc. Symp. Multiple-Source Urban Diffusion Models, Chapel Hill, N. C., 1969, p. 5-1 to 5-38. 50 refs.

GPO

The development of two different types of diffusion models for carbon monoxide: a synoptic model, which calculates hour-to-hour concentrations, for verification studies and possible operational use, and a climatological model, which calculates arithmetic mean concentrations and frequencies of extreme concentrations, for planning use is discussed. The design of these two models, as well as the results of limited evaluation trials of an early version of the synoptic model are described. The synoptic model design is based upon a modification of a receptor-oriented model, and emphasizes practicality, generality and completeness. The present version of the model includes provision for handling extra-urban as well as intra-urban sources. In addition, a street submodel is being developed. Based largely upon experimental work, it converts the intra-urban background to street-level concentrations. When incorporated, this should substantially improve the agreement between calculated and observed values at the Continuous Air Monitoring Projects Stations. The climatological model is similar in basic form to the synoptic model but uses the joint frequency function for all combinations of specified classes of the input parameters, derived from a large body of hourly meteorological data. The arithmetic mean concentration thus obtained is then used in statistical relationships, derived from CO concentration data, to calculate the magnitude of high percentile and maximum concentrations for any averaging time. Alternately, such calculations can be performed directly

using the predicted concentration joint frequency function. Implementation of the model required the development of an objective technique for converting traffic data to a time- and space-dependent CO emission inventory, as well as methods for estimation of the meteorological variables appropriate to the urban area from routinely available airport weather data. The accuracy of these methods effectively establishes an upper limit to the model prediction accuracy. Sample computed area-wide concentration patterns and time-varying point concentrations for St. Louis and Washington, D. C., are presented. As expected, the preliminary calculated concentrations are, for the most part, lower than those observed at the CAMP Stations, reflecting the need for incorporation of the street submodel into the program. The need for better treatment of light-wind conditions is also indicated by these evaluation trials; possible improvements are discussed. (Author abstract)

22556

APTIC NO. 41803

Kawano S., and K. Iida

THE ESTIMATION OF THE AIR POLLUTION AND THE EXPERIMENTAL STUDIES OF THE ATMOSPHERIC DIFFUSION. (Taiki kakusan chosa to taiki osen no yosoku ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Society of Air Pollution), 6(1):137, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

Atmospheric diffusion was investigated at a power plant which burned 85,160 kg/sec of heavy oil containing 1.99% sulfur. The rate of flue gas discharge was 1,107,000 N cu m/hr with a speed of 31.6 m/sec, and the stack height was 150 m. The results were summarized as follows: during summer stability was recorded as A B for high smoke source; stabilities were recorded as C-C D twice out of seven investigations; the concentration distribution could not be simply determined by sigma-y(c) and wind speed. Many unsolved questions remain for further studies.

22557

APTIC NO. 40983

Kopeck, Richard J.

GLOBAL CLIMATE CHANGE AND THE IMPACT OF A MAXIMUM SEA LEVEL ON COASTAL SETTLEMENT. J. Geogr., 70(9):541-550, Dec. 1971. 25 refs.

Manmade atmospheric pollution (such as carbon dioxide and particulates) may promote higher global air temperatures and ultimately coastal flooding through melting of all solid water forms. The probability of such an event is examined, and the possible extent of change in continental shapes and sizes and the impact of world inundation on population densities and distributions are analyzed cartographically. Projecting to 2050 A.D. as the earliest possible date for the maximization of this occurrence, it is expected that the expanding oceans will have reduced continental surfaces by approximately 17%, and roughly 19% of the population of the mid-21st century will have been relocated.

22558

APTIC NO. 41762

Ledbetter, Joe O.

VARIATION OF POLLUTANT CONCENTRATION WITH SAMPLING TIME. Environ. Letters, 3(3):159-169, 1972. 20 refs. (Presented at the 11th Industrial Hygiene and Air Pollution Conference, Symposium on Air Sampling, Texas Univ., Austin, Nov. 1-2, 1971.)

Several factors should be considered in the planning of air sampling or in the interpretation of sampling data. The sampling time is one of the most important parameters because the pollutant concentration at a point varies with time, and the concentration sampled depends on the sampling time. Fluctuations in pollutant concentrations must be considered before deciding when to sample and how to sample. The lognormal frequency distribution can be used to fit the frequency curves

of the random variations of concentration caused by incomplete mixing of the pollutant. Extrapolation of the lognormal for predicting extreme values is poor practice. The peak-to-mean concentration ratios for continual air sampling vary with sampling time to a power. For the average condition the power may be taken as -0.20; it should be more negative, about -0.35, for the poorly mixed conditions, and less negative, about -0.10, for highly mixed cases. The errors caused by not considering the temporal fluctuations of pollutant concentrations are usually much larger than the inaccuracies of the sampling and analytical method. Concentrations vary with season, stability, turbulence, and other meteorological factors.

22559

APTIC NO. 41516

Litvinov, I. V.

THE POSSIBILITY OF ARTIFICIAL CLOUD AND PRECIPITATION TRANSFORMATION IN THE CENTRAL AREA OF THE EUROPEAN USSR TERRITORY.

(Vozmozhnost iskusstvennogo preobrazovaniya oblakov i osadkov central'nogo rayona Evropeyskoy territorii Sovyetskogo Soyuza). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 19:27-49, 1970. 56 refs.

Balloon tests and mathematical calculations were used to study the frequency of conditions suitable for transforming clouds during the winter and summer periods in the central area of the European USSR territory. The cloud water resources, required for additional precipitation in winter, are slightly dependent on the previous precipitation. Dynamic equilibrium between water loss and gain in rain clouds is probable. Assuming cloud drift at wind velocity, maximum amount of artificial precipitation can be obtained from clouds other than rain clouds. Both wind speed and direction variations above 500 m have about the same frequency for rain and non-rain clouds. The additional precipitation accounts to about 10% of the yearly average related to the winter period. The time required for clouds to recover after precipitation was calculated. An investigation of the frequency of maximum wind speed variations of 2-3 m/sec, and of maximum direction variations of 20 degrees, required for cloud dissipation in winter, established that snow can be prevented in 20% of all cases. The frequency decreased with increased cloud layer thickness. Cloud modifications over an area of 100,000 to 1,000,000 sq km may result in temperature and pressure variations in the atmosphere. The stimulation of ascending currents and seeding are possible consequences of influencing clouds in the summer. The inversion layers can be broken by artificial warm currents in about 75% of all cases. However, piercing inversion layers are only a necessary but not sufficient condition for precipitation. Descending currents, as created by aircraft, are required for cloud dissipation. The estimation of possibilities of generating artificial precipitation from summer clouds by seeding is difficult due to the varying water contents. No methods for generating artificial precipitation from and for dissipating warm and stratified clouds, or for the dissipation of warm fogs, have yet been satisfactorily elaborated.

22560

APTIC NO. 41944

Loeb, Leonard B.

ON THE APPEARANCE AND MECHANISMS OF FORMATION OF LANGEVIN-TYPE IONS AND RELATED NUCLEI. J. Aerosol Sci., 2(2):133-139, June 1971. 35 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

Attention is called to the existence of a stable class of nuclei which when charged are called Langevin ions and unchanged are called Langevin nuclei. These have diameters lying around 10 to the minus 6th to 10 to the minus 7th cm, depending on humidity, and consist of 1,000,000 water molecules often formed about some chemical center. They readily lead to cloudy condensation on saturation. The various processes by which such nuclei are formed are discussed. Langevin parti-

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cles have been made in the laboratory through the use of charged fields and hypersonic jets in humid air. They may also be formed through the generation of shear stresses during breakup of raindrops in terminal velocity fall, high velocity impact, or the bursting of bubbles. These conditions are similar to those created by waves action on a shoreline or open ocean storm conditions. The hazes produced by aggregates of such particles are frequently mistaken for smogs, though they may come from natural causes.

22561

APTIC NO. 41714

Lovelock, J. E., R. J. Maggs, and R. A. Rasmussen

ATMOSPHERIC DIMETHYL SULPHIDE AND THE NATURAL SULPHUR CYCLE. *Nature (London)*, 237(5356):452-453, June 23, 1972. 6 refs.

Dimethyl sulfide is proposed as the natural sulfur compound which fills the role, originally assigned to hydrogen sulfide, of transferring sulfur from the seas through the air to land surfaces. Preliminary measurements were made of the concentration of DMS in seawater, and of its emission by land plants, soils, and marine algae. Analyses were made by gas chromatography using a flame photometric detector specific for sulfur compounds. All seawater samples showed the presence of DMS, and the average seawater concentration was 1.2 times reciprocal 10 to the 11th g/ml. The distribution coefficient of DMS between air and seawater was 0.30, corresponding to an atmospheric concentration of 1.2 ppb at equilibrium. The emission of DMS from a few samples of marine algae, mostly varieties of *Laminaria*, ranged from 50 to 400 times reciprocal 10 to the 12th g/h of fresh wet tissue. The emission from living intact leaves of oak, cotton, spruce, and pine trees ranged from 2 to 43 times reciprocal 10 to the 12th g/g of oven dried tissue/hr; the rate of emission for decaying leaves from the same species was 10 to 100 times greater. All soil samples taken produced DMS if contained in flasks sealed with glass wool, allowing restricted exchange of gases with the surrounding air. If the flasks were completely sealed, DMS production fell and hydrogen sulfide was produced. The quantity of sulfur of biological origin required to balance the sulfur cycle by transfer through the atmosphere is approximately 10 to the 8th tons/yr. If this transfer is mostly as DMS and has an atmospheric residence time of one week, characteristic of a moderately reactive gas, the anticipated equilibrium concentration would be 4 times reciprocal 10 to 10th parts by volume. The seawater concentration and the emissions from soil and plants, if representative, could sustain an atmospheric concentration of this order. Oxidation of DMS under conditions simulating atmospheric photochemical oxidation leads principally to dimethyl sulfoxide, methane sulfonic acid, sulfur dioxide, and sulfuric acid. Dimethyl sulfoxide is an early product of oxidation and because of its low volatility and hygroscopic nature, would presumably be scavenged from the air by rain or surface adsorption. Therefore DMS may be a lesser potential source of sulfate aerosol than are the inorganic sulfur compounds which enter the atmosphere.

22562

APTIC NO. 41621

Mani, A., B. B. Huddar, and G. P. Srivastava

ELECTRICAL CONDUCTIVITY AND POTENTIAL GRADIENT MEASUREMENTS IN THE FREE ATMOSPHERE OVER INDIA. *Indian J. Pure Appl. Phys. (New Delhi)*, vol. 9:992-996, Nov. 1971. 22 refs.

Results of measurements of atmospheric electrical potential gradient and conductivity in the free atmosphere using balloon borne radiosondes made at a few stations in India are presented. The potential gradient generally decreases exponentially with height above the exchange layer and the electrical conductivity profiles show corresponding mirror image symmetry. Large variations of electrical potential gradient and conductivity are, however, observed in the troposphere closely associated with clouds, dust, and haze, and other local meteorological phenomena and space charge effects. Signifi-

cant, though small, variations are also observed in the stratosphere, which appear to be associated with the existence of aerosol layers. From an analysis of integrated potential profiles, the total atmospheric potential has been calculated and found to have a mean value of about 300 kV; the ionospheric potential varies diurnally and seasonally about the mean. (Author abstract modified)

22563

APTIC NO. 41123

Marquardt, W. and P. Ihle

FALL-OUT OF FISSION PRODUCTS FROM THE ATMOSPHERE. (Der Ausfall von Spaltprodukten aus der Atmosphäre). Text in German. *Z. Meteorol.*, 22(11/12):352-367, 1971. 65 refs.

Radioactive aerosols and gases emitted from atomic power plants deposit partly in the near or distant surrounding of a plant, depending on meteorological conditions. All influences affecting radioactive fallout must be known in order to be able to predict the possible contamination of soil, water, and vegetation. Dry deposits originate from gravity or molecular and turbulent diffusion. From theoretical consideration, gravity can be neglected for particles less or equal to 10 micro m. Emitted aerosols are in the environment in question mostly smaller even after processes of coagulescence; therefore, the calculation of dry deposits is made using the so-called depositing velocity, which depends on the fission products, the depositing areas, and the meteorological conditions. Theoretical and experimental results and particularly the J-131 are discussed. Safety aspects are included for values of the depositing velocity. Wet deposits are subdivided into rainout and washout. Rainout is important only if radioactive aerosols and gases spread out in an area where precipitation processes are caused by condensation simultaneously; otherwise, washout processes predominate. Theoretical aspects of rainout and washout and the various obtainable and not obtainable parameters are discussed. The spectrum of the sizes of precipitation and of the emitted aerosols are of particular significance. Safety aspects are given preference as regards suggestions for the washout coefficient. Difficulties of the quantitative analysis of various influences are shown. The most significant factors of influence and their mutual connections are shown in a model.

22564

APTIC NO. 41804

Mathe, P.

CONTROL VIA THE INTERACTIONS BETWEEN GASEOUS AND PERCEPTIBLE SUBSTANCES IN THE ECOLOGICAL SYSTEM. (Steuerung ueber Wechselwirkungen gasfoermiger und riechbarer Substanzen im Oekosystem). Text in German. *Schriftenreihe Ver. Wasser-Boden-Lufthyg. (Berlin)*, no. 35:141-145, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Plants emit oxygen which is vital to humans and animals. Its supply controls the largest part of annoying odors by the ratio between aerobic to anaerobic organisms. The green areas of the Federal Republic of Germany produce annually about 160 to 200 million tons of oxygen. Motor vehicles alone consume 60 million tons of oxygen; primary energy production consumes about 600 million tons per year. Vegetation emits about 1 million tons annually of gaseous organic substances, mostly terpenes which participate in forming Aitken nuclei and which coagulate upon aging. All efforts and all legislation should be directed toward maintenance of a healthy environment which also contains traces of aromatics and phytogetic condensation nuclei and which is not absolutely clean in a chemical sense. 0

22565

APTIC NO. 41512

Matveyev, V. N.

WING ANEMOMETERS FOR LOW SPEEDS. (*Kryly chatye anemometry malykh skorostey*). Text in Russian. *Tr. Inst. Eksp. Meteorol.*, no. 20:109-114, 1971. 8 refs.

Theoretical possibilities of reducing the lower speed threshold of wing anemometers, as used in studies of low-speed fluid aerosol currents, and wing anemometers with decreased friction torque are examined. Formulas for determining the effect of the medium density on the rotation speed of the wings are presented. The lower speed threshold of wing anemometers can be lowered by reducing the static friction torque, which is also suitable for reducing the density-dependence of the instrument parameters. The friction torque can be further reduced by applying an angular momentum which compensates for the static friction torque. Immersed and non-immersed type wing anemometers, applying both of the above solutions, were developed. The non-immersed wing anemometers with ruby bearings and without speedometer have a lower threshold of 2 m/sec and linear characteristics up to 70 cm/sec. The speed of rotation is controlled by a photocell connected to a transistorized frequency measuring unit. The immersed type wing anemometer has linear characteristics from about 7 cm/sec. The error of the anemometers was less than + or 5%.

22566

APTIC NO. 41501

Mizoguchi, T., Y. Ishikawa, H. Nomoto, and A. Miyao

THE STATE OF AIR POLLUTION IN OSAKA. (Osaka-fuka ni okeru taiki osen no jokyō). Text in Japanese. Taiki Osen Kenkyū (J. Japan Soc. Air Pollution), 4(1):7, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Meteorological factors were observed between Nov. 1968 and March 1969 in Osaka Prefecture to clarify their relationship with air pollution and smog. Hourly wind direction and velocity, temperature, sulfur dioxide concentrations at various locations, and correlations were studied. In general, high concentration of SO₂ occurred and spread about two o'clock in the afternoon when the sea breeze rose. At the time of high concentration, the directions of the winds on the ground and in the upper atmosphere were different. High concentrations of SO₂ occurred when the pollution potential pressure was sustained for at least two or three days or more. During the winter months, the average SO₂ concentration was highest in the center part of Osaka city, and less in the peripheral areas.

22567

APTIC NO. 41021

Mukhenberg, V. V.

SOLAR RADIATION ABSORPTION BY THE EARTH ATMOSPHERE. (Solnechnaya radiatsiya, pogloshchayemaya zemnoy atmosferoy). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 249:41-46, 1969. 8 refs.

The steric distribution of the solar radiation absorption by the earth atmosphere was studied, and a world map of the short-wave energy budget of the atmosphere for December and June was prepared. The field of the absorbed radiation was found to be fairly homogeneous, and the range of the monthly variations in the total radiation absorption was determined to be relatively small with 0-2000 cal/sq cm/mo in winter and 4000-10,000 cal/sq cm/mo in summer. Increased radiation absorption from the poles towards the equator on continents and oceans alike was observed in winter. In summer, however, the proportion of the radiation absorbed by the atmosphere increased from low to high latitudes, with the maximum above the oceans (about 10,000 cal/sq cm/mo), and minimum above oceans, subtropic and tropic zones, and deserts (4000-5000 cal/sq cm/mo). The yearly amplitude was lowest for low latitudes, while considerable differences between summer and winter under high and temperate latitudes were observed. The proportion of the radiation irradiated into outer space under southern latitudes accounts for 34-36% of the solar radiation entering the top layer of the atmosphere. Some one-third of the total radiation absorbed by the Earth is absorbed by the atmosphere, which accounts for about one-half the amount absorbed by the earth surface. The differences in the atmospheric absorption at different latitudes varies from 25 to 48%, with the maximum under high latitudes on both hemispheres. The atmospheric absorption is increased some 20-25% by cloudiness.

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22568

APTIC NO. 41094

Mushkin, I. G., Yu. A. Peschanikii, and M. G. Sanoyan

DETERMINING THE THRESHOLD FIGURES OF THE INITIAL PARAMETERS IN THE COMPUTATION OF TURBULENT CURRENTS BY MEANS OF CALORIC BALANCE PROCEDURES. (Opredeleniye porogovykh znacheniy iskhodnykh parametrov pri vychislenii turbulentnykh potokov po metodu teplovogo balansa). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 249:85-93, 1969. 11 refs.

Possible errors in the determination of heat balance elements (total evaporation, turbulent thermal current, coefficient of turbulent transfer, and coefficient of humidity supply) were assessed, and the threshold (minimum) values of the initial parameters, for which sufficient accuracy in the computation is secured, are approximately determined. Errors for low values of the initial parameters are highest, and therefore 5-50% values are considered. The maximum absolute error for a single reading constitutes the greatest error component. Equations are given for the maximum transformed error occurring in the different parameters. The root-mean-square deviation for single reading, which characterizes the error probability, represents a more relevant factor. The accuracy can be considerably increased by applying the root-mean-square deviation for measurement series. Assuming initial parameters limited by a maximum, a graphic representation of the dependence of the root-mean-square value of the transformed error of the initial parameter absolute value, related to the maximum value, can be used to determine the threshold figure of the initial parameters. The number of readings required for averaging is determined as a function of the dynamic range for different instruments.

22569

APTIC NO. 41600

Niemann, Ernst-G.

MEASUREMENT OF LOCAL DISTRIBUTION OF MATTER IN AGRICULTURE. APPLICATION OF TRACER TECHNIQUES. (Messen der örtlichen Verteilung von Substanzen im Landbau. Die Anwendung von Markierungsmethoden). Text in German. Grundle. Landtech., 22(3): 85-88, 1972. 8 refs.

The measurement of the local distribution and dispersion of substances in agriculture by means of tracer techniques is outlined with special regard to the tracer activation method and its possible uses. Diffusion and distribution studies on particles, liquids, and aerosols require chemical or radioactive labeling techniques applying pigments, odorous, fluorescent, or radioactive tracers. The disadvantages involved in the short half-life period and the radiation hazards of certain radioactive isotopes can be eliminated by the application of the tracer activation method where non-radioactive isotopes, capable of being activated, are added to the specimen. The tracer contained in the sample is then activated in a reactor, preferably by means of thermal neutrons, and the tracer concentration is determined from the induced radioactivity. Such tracers must be in very low concentrations and must be readily incorporated without damaging the above system. Such tracers can be used for labeling pollens, spores, and industrial waste gases. Air can be labeled by means of volatile boron compounds such as methylboric acid. The natural B-10 isotope, when bombarded with thermal neutrons, is converted into lithium-7 isotope.

22570

APTIC NO. 41080

Niizu, Yasushi

THE AIR AROUND US. (Wareware no mawari no kuki). Text in Japanese. Shisutemu to Seigyo (Syst. Control), 15(11):932-945, Nov. 1971. 21 refs.

The method of measuring suspended particulates using light scattering counters is explained and discussed mathematically. The relationship of dust concentration and particle numbers and sizes, and various conditions affecting concentration and

ATMOSPHERIC INTERACTION

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distribution are examined. In order to minimize the errors that occur when measuring suspended particulates, a dilution apparatus was constructed and a test was carried out. Such factors as pressure loss, mixtures, sampling position, uneven speed suction, and particle losses in the sampling tube, did not influence the results too much. Typical days records from four seasons in Osaka were studied; a relatively high dust concentration occurred throughout the year, in spite of the fact that rather drastic fluctuations in short periods do occur from time to time. In winter, 5000 particles of larger than 0.3 micron have been counted in ml of air. Only in the typhoon season (September), could a very low concentration of 3 particles/ml be reached which is equivalent to that of the ocean. The most effective cause for low concentration of particulates in the air was a strong wind. The particle size distribution in the air is relatively stable in comparison to the drastic fluctuations of dust concentration. The results were similar to those of the United States, 90% of the particles were less than 0.5 micron, and 99% were less than 1 micron.

22571

APTIC NO. 41578

Niyliak, Kh. Yu.

ON THE DEPENDENCE OF THE SPECTRAL DISTRIBUTION OF THE INFRARED RADIATION FLUXES ON THE CONCENTRATION OF CARBON DIOXIDE IN THE ATMOSPHERE. (*O zavisimosti spektral'nogo raspredeleniya potokov teplovoi radiatsii ot kontsentratsii uglekislogo gaza v atmosfere*). Text in Russian. *Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana*, 8(12):177-191, 1972. 16 refs.

The dependence of infrared radiation fluxes and flux divergences on the concentration of carbon dioxide in the atmosphere was studied. The CO₂ absorption band was divided into ten intervals with a width of 25/cm. For each of them, the vertical distribution, up to 40 km, of downward, upward and net infrared radiation fluxes and of the flux divergence was calculated in three models of the atmosphere, i.e., standard atmosphere, summer, and winter for three values of CO₂ concentration, 0.015, 0.030 and 0.060% by volume. A new, more exact method of calculating spectral radiation fluxes was developed; the main principles of this method are described. The results of the calculations are included. The greatest dependence of infrared radiation of the CO₂ content in the atmosphere occurred in conditions of moderate values of the atmospheric transmission function; in the case of very large or very small values of the transmission function, the variation of infrared radiation, due to variations in CO₂ concentration, was negligible. Such moderate values of the spectral transmission function occurred in the central region of the CO₂ absorption band in the case of small values of the CO₂ content and on the wings of the absorption band in the case of moderate and large values of the CO₂ content. 1/2

22572

APTIC NO. 41476

Nolan, P. J. and J. A. Scott

THE INFLUENCE OF VARIATIONS IN PRESSURE AND TEMPERATURE ON THE CALIBRATION OF A PHOTO-ELECTRIC NUCLEUS COUNTER. *Proc. Roy. Irish Acad., Sect. A*, 64(3):37-48, Dec. 1964. 9 refs.

The mass of water released in an adiabatic expansion in a photo-electric nucleus counter depends on the pressure in the counter. The resulting effect on the size of the cloud droplets and on the reading of the counter is examined. Results in agreement with the experiment were obtained. An examination of the influence of temperature variation also gives results in agreement with previous observations. Correction factors for small variations in pressure and temperature of the photo-electric counter are given. (Author abstract)

22573

APTIC NO. 41487

Nolan, P. J. and J. A. Scott

THE EXHAUSTION METHOD OF NUCLEUS SIZE ANALYSIS. *Proc. Roy. Irish Acad., Sect. A*, 65(2):13-25, June 1966. 10 refs.

The exhaustion method of Pollak and Metnieks for resolving heterogeneous aerosols into their components from measurements with the Nolan-Guerrini diffusion apparatus is examined. While the method is theoretically correct, the practical application is very laborious and is liable to give rise to considerable errors owing to the uncertainty in the extrapolations involved. A formula is developed showing how the difference between the mean diffusion coefficient and the coefficient measured with a large air-flow depends on the dispersion of the aerosol distribution. A short discussion on the penetration curves of Fuchs is included. (Author abstract)

22574

APTIC NO. 41498

Nonaka, H., S. Izumikawa, Y. Sato, S. Kurashina, and S. Suzuki

CORRELATIONS BETWEEN AIR POLLUTANTS. (*Taiki osen busshitsu-kan no sokansei ni tsuite*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):11, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The correlations among air pollutants were calculated from the records of the National Air Pollution Monitoring Station in Tokyo. Correlations of pollutant measurements for 30 hr when the carbon monoxide concentrations were over 30 ppm and less than 30 ppm were of special interest. High correlations (index of more than 0.70) were noted between sulfur dioxide and nitrogen dioxide, and hydrocarbons, dust and CO and temperature and humidity. The highest correlation was between SO₂ and humidity when CO concentration was less than 30 ppm. The arrangement of pollutants were grouped. When the CO concentration was more than 30 ppm, groups formed among temperature and humidity; NO₂, SO₂, dust and CO; and nitric oxide and HC. When the concentration was less than 30 ppm, groups were formed among NO₂, SO₂, humidity, and NO; dust CO, temperature; and HC only. Correlation indices were corrected by multiplication of 100 in order to get the absolute figures.

22575

APTIC NO. 41226

Odaira, Toshio

PHOTOCHEMICAL AIR POLLUTION IN TOKYO. *Tokyo Metropolitan Environmental Protection Research Inst. (Japan), Air Pollution Section*, 20p., Oct. 1971.

The appearance of high concentrations of oxidant pollution (0.15 ppm/hr) in Tokyo, the relationship between oxidants and other pollutants, and the relationship between topography and the occurrence of health hazards are reported. For 59 days out of the 3-year study period from 1967 to 1970, the oxidant level exceeded the 0.15 ppm/hr warning level. There was good weather on 45 of the days and cloudy weather on 14 of the days. There was no noticeable connection between temperature and high oxidant concentration. Higher concentrations were noted with a wind velocity in the range of 1-3.9 m/sec than in calmer winds. Other favorable conditions for high concentrations were the formation of inversion zones in the atmosphere at about 1000 m, an atmospheric pressure pattern of south high and north low, and the creation of convergence zones caused by sea breezes. Daily variation in oxidant concentration was charted for several of the high oxidant days. Incidences of health effects of pollution were highest in basin and valley areas and other weak wind zones. An interim report for the summer of 1971 concerning the results of a three dimensional survey taken from several elevated locations is also included.

22576

APTIC NO. 41170

Ohira, R., M. Utagawa, and M. Funajima

CORRELATIONS BETWEEN HIGH ALTITUDE SULFUR DIOXIDE CONCENTRATION AT TOKYO TOWER AND GROUND CONCENTRATION. (*Tokyo tawa kosho ni okeru arisan gasu konodo o sen to heimen sokutei ten to no kankei ni suite*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):10, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Monitoring of sulfur dioxide concentration and suspended particulates was started at Tokyo Tower in February 1969. The relationship between high altitude high concentrations of SO₂ and ground measurements are analyzed, taking the cases of May 9 and 10 as examples. On both days, high pressure existed south of the Japanese archipelago and low pressure was detected in the ocean east of Hokkaido. The wind was southerly. The SO₂ concentration began to rise early in the morning on 9th, as soon as south wind reached the air above Tokyo, and 0.5 ppm concentration was detected at 125 m and 225 m. The concentration rose to 0.65 ppm at 125 m, and to 0.85 ppm at 225 around 11 am. It decreased to 0.3 ppm about 3 pm, but again rose to the same maximum about 5 pm, and stayed at the same level until 9 pm. In Ota ward and Koto ward on the ground high concentrations appeared from 7 am and continued until 11 pm. The similar pattern of two peaks appeared in other parts of the city. On May 10, 0.7 ppm concentration appeared at the altitude of 225 m around 10 am when the wind blew from south. In center city, southerly and easterly wind caused high concentration. At the Metropolitan government office and in peripheral areas, pollution was generally low; but the effect of high concentration at Tokyo Tower was felt one hour after its appearance.

22577

APTIC NO. 41502

Ohira, T. and S. Fukuoka

CORRELATIONS BETWEEN HIGH ALTITUDE SULFUR DIOXIDE CONCENTRATION AT TOKYO AND CLIMATIC CONDITIONS. (*Tokyo tawa ni okeru kodo-betsu arisan gasu nodo to ki ho joken to no kankei ni suite*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):9, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

One of the characteristics of air pollution patterns observed at Tokyo Tower is the fact that higher sulfur dioxide concentrations are found in higher altitudes (especially around 125 m) rather than near the ground. During April and June, monthly averages of SO₂ concentration at 125 m are approximately three times those measured at 25 m. At 125 m, they range from 10.2 ppm to 12.7 ppm, while the averages measured at other continuously monitored locations in the city generally range from 3.8 to 8.8 ppm. Meteorological factors were examined to clarify the causes of this phenomenon. In the areas of 125 to 225 m altitude, high concentrations seemed to occur when the wind was southerly, but in particular when it was south-southwest. At 25 m altitude, no particular pattern or correlation appeared. The frequency of high concentration occurrence when the wind is SSW 57% of the time at 125 m, and 49% at 225 m. When the wind is southwest, the frequency is 39% at 125 m. When the wind is south, the frequency is 27% at 225 m. Northerly winds showed less than 10% frequency of air pollution at any altitude. When northerly wind velocity increased, SO₂ concentration decreased. This was not the case with southerly winds. The SO₂ high concentration occurred when the wind velocity was between 5 to 7 m/sec rather than when it was weak (0.2 m/sec).

22578

APTIC NO. 42075

Ohira, Toshio

AN OUTLINE OF PHOTOCHEMICAL SMOG IN TOKYO. (*Tokyo ni okeru kokagaku-smoggu no gaiyo*).

Text in Japanese. Rodo no Kagaku (Dig. Sci. Labor), 27(2/3):26-37, March 1972.

Measurements of oxidants (nitrogen dioxide, nitric oxide, peroxyacetyl nitrate) at an air pollution monitoring station in Shinjuku Ward in Tokyo during 1967 through 1970 (April through October of each year) was analyzed. During these four years, 60 days had an hourly mean value of over 0.15 ppm. This value is standard for issuing a photochemical smog alarm in Tokyo. Of these days, 64% were in summer (June, July, and August) and 72% showed their peak between 11 am and 1 pm. Fine days accounted for 79%, and when the visibility was below 4 km early in the morning, oxidants tended to be over 0.15 ppm/hr toward noon. No correlation was recognized concerning the temperature and the wind direction, but oxidants concentration seemed to be high when the wind speed was 1-3.9 m/sec and when the atmospheric inversion layer was about 1000 m above the ground. Sixty-eight percent of these days indicated a distribution of atmospheric pressure when Japan was entirely covered with an anticyclone, when southern Japan was covered with an anticyclone and the northern was low, or when a front of atmospheric pressure was on the south coast. When a sea breeze front was formed in inland areas such as Shinjuku, Suginami, or Setagaya, very light and converging winds appeared in these areas, and they seemed to play an important part in producing high concentrations of oxidant. The relationship between daily fluctuation of oxidants concentration and that of other pollutants was not always the same as the relation found in the U. S., and that seemed to be caused by existence of sulfur dioxide and airborne dust in Tokyo. When increasing oxidants were recorded between 6 pm and 6 am of the following morning, most of their peaks were seen between 8 pm and 12 pm. That was observed especially in winter. An intermediary report on the three-dimensional photochemical smog investigation done in July and August 1971 is also mentioned. Measurements of carbon monoxide, SO₂, and ozone are mentioned.

22579

APTIC NO. 41665

Papetti, R. A. and F. R. Gilmore

AIR POLLUTION. *Endeavour*, 30(111):107-114, Sept. 1971. 32 refs.

Generation and atmospheric behavior of particulate matter, oxides of sulfur, photochemical smog constituents, carbon monoxide, nitrogen oxides, and metals is described. Meteorological influences (such as wind, stability and turbulence) on air pollutants and harmful health effects are summarized. The theory and applications of several types of mathematical models for calculating pollutant distribution, including Gaussian distribution, integrated puff models, and mass balance relations are presented. Ambient air quality standards for California are presented for oxidants, CO, sulfur dioxide, particulates, hydrogen sulfide, and nitrogen dioxide. Air pollution episodes are mentioned.

22580

APTIC NO. 42045

Pasquill, F.

ATMOSPHERIC DISPERSION OF POLLUTION. *Quart. J. Roy. Meteorol. Soc. (London)*, 97(414):369-395, Oct. 1971. 40 refs. (Presented at the Royal Meteorological Society Meeting, London, England, April 21, 1971.)

The basic theoretical framework and history of idealized dispersion formulae are reviewed; the performance of the particular versions which seem most currently useful are described. The development of formulae for the task of estimating numerically the concentration likely to exist downwind of a continuous point source of specified strength is particularly emphasized. The behavior of effluent plumes from modern power stations, the local distribution of pollution from an urban-industrial complex of sources, and the transport and distribution of pollution on a national or regional scale are also considered.

ATMOSPHERIC INTERACTION

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22586

22581

APTIC NO. 41930

Plass, Gilbert N. and George W. Kattawar

EFFECT OF AEROSOL VARIATION ON RADIANCE IN THE EARTH'S ATMOSPHERE-OCEAN SYSTEM. *Appl. Opt.*, 11(7):1598-1604, July 1972. 15 refs.

Reflected and transmitted radiance is calculated for a realistic model of the atmosphere-ocean system. Multiple scattering to all orders as well as anisotropic scattering from aerosols are taken into account by a Monte Carlo technique. The probability for reflection or refraction at the ocean surface is calculated for each photon. Scattering and absorption by water molecules (Rayleigh) and by hydrosols (Mie) are taken into account within the ocean. The radiance is calculated for a normal aerosol distribution as well as for a three and ten times normal distribution. Calculations are also made for an aerosol layer near the earth and for one in the stratosphere. The upward radiance at the top of the atmosphere depends strongly on the total number of aerosols but not on their spatial distribution. Variations in the ozone amount also have little effect on the upward radiance. Calculations were made at the 0.7, 0.9, and 1.67 micron wavelength. Radiance above and below the ocean surface as well as the flux at various levels are also discussed. (Author abstract modified)

22582

APTIC NO. 41926

Pueschel, R. F. and B. G. Mendonca

SOURCES OF ATMOSPHERIC PARTICULATE MATTER ON HAWAII. *Tellus (Uppsala)*, 24(2):139-149, 1972. 13 refs.

Sources and advection of atmospheric particulate matter on the Island of Hawaii were assessed to evaluate properly the benchmark qualities of the air at the Mauna Loa Geophysical Observatory. A manually operated Gardner counter, a continually recording Aitken counter, and a nephelometer were used to measure diurnal and long term trends of concentrations and light scattering coefficients of atmospheric particulates. Significant sources of aerosol particles are combustion activities on the island, both man-made and volcanic. Volcanic effluent can penetrate the tradewind inversion when conditions are right and show up on long term Aitken counts. The relative contribution of marine aerosols to the particle population in the air masses over the island is small. The difference in concentration and the light scattering coefficient of particles in the air masses above and below the tradewind inversion are of the order of one magnitude or more. (Author abstract modified)

22583

APTIC NO. 41929

Quiney, R. G. and A. I. Carswell

LABORATORY MEASUREMENTS OF LIGHT SCATTERING BY SIMULATED ATMOSPHERIC AEROSOLS. *Appl. Opt.*, 11(7):1611-1618, July 1972. 15 refs.

Angular light scattering experiments in the atmosphere are capable of measuring small changes in the properties of aerosols, such as growth due to increasing relative humidity. Absolute determinations, such as that of the particle size distribution, are much more difficult. The principal scattering matrix elements of laboratory air are presented as a function of relative humidity. The trends follow those expected for particles growing by accretion of water vapor as relative humidity increases. The results presented for water droplet clouds compare well with the calculations of Deirmendjian for homogeneous water spheres. In both cases inversion of the data to yield the particle size distribution is complicated, and the present experiments are therefore analyzed quantitatively. A sensitive automated polar nephelometer was utilized to record the scattered light as a function of scattering angle, and a digital computer was used to calculate the matrix elements from the raw experimental data. (Author conclusions modified)

22584

APTIC NO. 42036

Ramsdell, J. V., Jr. and W. T. Hinds

CONCENTRATION FLUCTUATIONS AND PEAK-TO-MEAN CONCENTRATION RATIOS IN PLUMES FROM A GROUND-LEVEL CONTINUOUS POINT SOURCE. *Atmos. Environ.*, 5(7):483-495, July 1971. 17 refs.

Diffusion data collected by 63 incremental samplers during four short duration, continuous releases of krypton 85 used to examine concentration fluctuations and peak-to-mean concentration ratios in the atmosphere. Cumulative frequency distributions and the intensity of short-term concentrations are shown to be a function of the relative crosswind position within the mean plume. Peak-to-mean concentration ratios are shown as a function of relative crosswind position within the plume and the ratio of the durations of the mean and the peak (time ratio). The relationship between the intensity of concentration fluctuations and the relative crosswind position is similar to that reported for laboratory data. The relationship between peak-to-mean ratios and the time-ratio was found to differ from the simple power law relationship suggested by several workers. Previous estimates of the peak-to-mean/time ratio relationship for positions near the mean plume axis are shown to be too low. (Author abstract)

22585

APTIC NO. 4157

Rao, V. Kuppu

THE BUOYANT PLUME ABOVE A HEAT SOURCE. *Atmos. Environ.*, 4(5):557-575, Sept. 1970. 8 refs.

The boundary layer type conservation equations of mass, momentum, and energy for the steady free turbulent flow in gravitational convection over heat sources are set up for both two dimensional and axisymmetric cases. These are reduced to ordinary differential equations in a similarity parameter by suitable transformations. The three classical hypotheses of turbulent diffusion -- the Constant Exchange Coefficient hypothesis, Prandtl's Momentum Transfer theory, and Taylor's Vorticity Transfer theory -- are then incorporated into these equations in succession. The resulting equations are solved numerically and the results are compared with some previously reported experimental findings on gravitational convection over heat sources. (Author abstract modified)

22586

APTIC NO. 41133

Restivo, Joe S.

A RESUME OF SHORT-RANGE FORECASTING TECHNIQUES. *Air Force Environmental Technical Applications Center, Washington, D. C., USAFETAC TN 71-10, 14p., Sept. 1972. 4 refs.*

NTIS: AD 731162

Short-range forecasting techniques are briefly reviewed with respect to category, i.e., extrapolation techniques, climatological forecast aids, and statistical prediction equations. Extrapolation techniques, considered within two subgroups refer to the forecasting of weather pattern features based solely on the past motions of that feature. One subgroup deals with the extrapolation of weather systems portrayed on local area surface charts (LASC) and includes pressure and frontal analysis, nephelanalysis, precipitation analysis, and isochrone analysis. The other subgroup deals with the analysis and extrapolation of selected parameters on various types of auxiliary charts and includes the use of time liner chart, trend charts, space-time charts, time cross-section charts, activity charts, and checkerboard charts. Climatological forecast aids portray concurrent relationships between ceiling and/or visibility categories and various parameters such as time of day, specific weather elements, wind direction, and map type and time-lag relationships between a specified initial weather condition at a specific time and subsequent weather conditions a certain number of hours after the initial time. Statistical methods of deriving ceiling and visibility prediction equations for short-range forecasting are also examined.

22587

APTIC NO. 41089

Ripperton, Lyman A. and Fred M. Vukovich

GAS PHASE DESTRUCTION OF TROPOSPHERIC OZONE. *J. Geophys. Res.*, 76(30):7328-7333, Oct. 20, 1971. 5 refs.

Although reaction with the earth's surface has been considered the major, if not the only, sink for tropospheric ozone, both theoretical considerations and field observation suggest that gas phase reactions are also a major sink. Field data have shown that gas phase destruction of ozone takes place, while also giving an indication of the magnitude of the process. Measurements of the oxides of nitrogen and ozone and the simultaneous changes observed in their concentrations bear out the concept that the oxides of nitrogen-ozone reactions are a significant sink for ozone. Proof for gas phase destruction of ozone in the atmosphere is given. (Author abstract modified)

22588

APTIC NO. 41657

Roberts, John J., Edward S. Croke, and Allen S. Kennedy

AN URBAN ATMOSPHERIC DISPERSION MODEL. *Public Health Service, National Air Pollution Control Administration and North Carolina Consortium on Air Pollution, Proc. Symp. Multiple-Source Urban Diffusion Models, Chapel Hill, N. C., 1969, p. 6-1 to 6-72. 22 refs. (GPO)*

A computerized, multi-source, atmospheric dispersion model designed for operational use in air resource management has been formulated and programmed for the IBM 360-75 system. This integrated puff model provides a more realistic physical simulation of the processes of smoke plume dispersion than has hitherto been employed, since it provides for simulation of near-zero wind speed conditions, models three dimensional wind vector variation and atmospheric diffusion, including up-wind-downwind diffusion, and permits variation of stability and mixing layer depth with time. The model consists of a series of algorithms assembled around a kernel that represents the transport and diffusion of pollutant species from point and area sources according to a Gaussian distribution in three dimensions. At present, the model is in the early stages of validation and has been tested against 1 month of hourly average sulfur dioxide data from five Chicago air quality monitoring stations. The ratio of standard deviation to mean values for all hourly SO₂ predictions is 0.93; for 6-hour predictions it is 0.64; and for 24-hour predictions is 0.43. Over 66% of the 24 hour values are within 0.05 ppm of observed values and 90% are within 0.1 ppm of the actual. (Author abstract modified)

22589

APTIC NO. 41920

Rodhe, Henning

A STUDY OF THE SULFUR BUDGET FOR THE ATMOSPHERE OVER NORTHERN EUROPE. *Tellus (Uppsala)*, 24(2):128-138, 1972. 24 refs.

The atmospheric sulfur budget for Northern Europe is discussed and compared with global averages. Anthropogenic sulfur sources in this area outweigh natural sources. A comparison between deposition and emission of sulfur within different regions in Northern Europe shows that the dispersion of sulfur has a continental character; i.e., since, on the average, sulfur is transported more than 1000 km before it is deposited, one country can be appreciably influenced by another. A tentative model for the variation of deposition with distance from a source is suggested. Application of the model gives an estimated turnover time for anthropogenic sulfur of 2-4 days. As a quantitative example, the distribution between various sources of sulfur deposition in Sweden was estimated. The calculations indicate that about half of the sulfur originates from foreign anthropogenic emissions, while the other half is caused by Swedish emissions and a natural background. Just as Sweden is influenced by the surrounding industrial countries, a large part of the sulfur emitted in Sweden is deposited outside the country. (Author abstract modified)

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22590

APTIC NO. 41530

Safe, S. and O. Hutzinger

POLYCHLORINATED BIPHENYLS: PHOTOLYSIS OF 2,4,6,2 PRIME, 4 PRIME, 6 PRIME-HEXACHLOROBIPHENYL. *Nature (London)*, 232(5313):641-642, Aug. 27, 1971. 10 refs. NRC 12031

The photochemical behavior of 2,4,6,2 prime, 4 prime, 6 prime-hexachlorobiphenyl is reported. A 25 mg sample in 2 ml of hexane was irradiated. Thin-layer chromatography revealed the presence of two major bands. The mass spectrum of band I indicated molecular ions corresponding to di, tri, tetra, penta, and hexachlorobiphenyls. Gas liquid chromatography of bands I and II revealed eight and three major peaks, respectively. When irradiation was conducted in methanol, similar results were obtained, but a third and more polar band appeared, containing oxygenated polychlorinated compounds. During photolysis, chlorine is readily removed from hexachlorobiphenyl, yielding compounds of lower chlorine content. Photochemical production of new compounds formed by loss of chlorine, rearrangement or condensation may lead to further complications in residue analysis with the possible appearance of chlorobiphenyls in environmental samples that are not in commercial mixtures.

22591

APTIC NO. 41088

Sax, R. I. and P. Goldsmith

NUCLEATION OF WATER DROPS BY BROWNIAN CONTACT WITH AGI AND OTHER AEROSOLS. *Quart. J. Roy. Meteorol. Soc. (London)*, 98(415):60-72, Jan. 1972. 32 refs.

Aitken-sized (0.01 micron) particles of silver iodide, copper iodide, and contaminated silver oxide were able to nucleate various sized water droplets in free fall (20-80 micron in radius) by a direct, diffusive or Brownian contact mechanism. The AgI aerosol was the most efficient nucleator, showing a probability of 100% at -16 C, 50% at about -14 C, and 1% at minus 11 C. These nucleation characteristics for AgI can be modelled from heterogeneous nucleation theory if the value of the contact parameter is assumed to be 0.70. Silver oxide, passing through carrier tubing previously contaminated with iodine, was only a slightly less efficient nucleating agent than AgI. Copper iodide had a nucleating efficiency corresponding to that which would theoretically be expected from an aerosol with a contact parameter of 0.55. Aerosols of the pure oxides of silver, platinum, and chromium were unable to cause nucleation at temperatures as low as -18 C. Auxiliary experiments indicated that the AgI aerosol had a small, but finite, nucleating efficiency at -5 C. Aitken-sized particles of AgI did not lose their nucleating ability when captured at temperatures higher than 0 C. Contact nucleation by the Brownian capture of Aitken particles may be an important enough process in the atmosphere to contribute significantly to the large amounts of ice which have been observed at relatively high (-10 C) temperatures in some clouds. (Author summary modified)

22592

APTIC NO. 41542

Schwartz, Josef and Marshall P. Tulin

CHIMNEY PLUMES IN NEUTRAL AND STABLE SURROUNDINGS. *Atmos. Environ.*, 6(1): 19-35, Jan. 1972. 17 refs.

A theoretical study of the rise of turbulent smoke plumes in a steady cross wind and a density stratified atmosphere is presented. The theory is based on the analogy between the rise of a plume and the rise of turbulent, two dimensional vortex pairs. Conservation laws for volume, buoyancy, and energy, and a hypothesis of self similarity are used. The theory proposed predicts that the rise of a buoyancy dominated smoke plume in a homogeneous atmosphere is proportional to the 2/3 power of its lateral distance from the stack. When the plume rises in a stably density stratified atmosphere, it will rise initially according to the 2/3 power law, then level off and finally fall back. The maximum plume rise in such cases is

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proportional to the cube root of the ratio of a buoyancy parameter and the atmospheric stratification parameter. The lateral distance downwind from the stack at which this maximum is reached is proportional to the square root of the same ratio. Comparisons are made between theory and available full scale data, showing generally good agreement. (Author abstract modified)

22593

APTIC NO. 41052

Seki, Toshihiko, Hidehiko Hoshikawa, Morio Suzuki, and Tadahsi Sugano

INVESTIGATION ON DIFFUSION OF AIR POLLUTING SUBSTANCES USING FLUORESEIN SODIUM (URANIN). (Fluorescein Sodium (Uranin) shiyo ni yoru Taikiosenbushitsu no Kakusan ni tsuite). Text in Japanese. Sendai-shi Eisei Kenkyusho Ho (Proc. Inst. Pub. Health, Sendai City), no. 2:157-163, 1971.

Investigations concerning the condition of diffusion and effects of preventing air pollution by green belts were made with stack gas from a 34 m chimney for 1 hr using uranin as a tracer. Anticipating a northwesterly wind, uranin recovering spots were fixed leeward from the source, and 27 vessels were placed 0.1 to 0.5 km away from the chimney in a 45 deg fan shaped area. The deposited amounts were measured by fluorospectrometry for 6 hr. Weather conditions on the day were bright and clear; temperature was 7.2 C; moisture, 64%; wind velocity 4.3 m/sec; main direction of wind was north to northwest. Collected amounts were 0.17 mg/sq m at 200 m, 0.23 mg/sq m at 300 m, 0.18 mg/sq m at 400 m, 0.13 mg/sq m at 500 m, 0.08 mg/sq m at 750 m, 0.05 mg/sq m at 1000 m, 0.07 mg/sq m at 1250 m, and 0 mg/sq m at 1500 m (the maximum value at each spot). The maximum concentration was seen at 200 m spot leeward (south-southeast); it decreased with distance from the spot; the longest polluted distance was 1250 m. Based on the observed amount of deposition, the range of polluted area and deposited amounts were compared to deduce the polluted area. The expected wind direction did not coincide completely with the actual wind.

22594

APTIC NO. 41931

Selezneva, E. S.

ESTIMATION OF THE BACKGROUND CONTAMINATION OF THE ATMOSPHERE FROM THE CHEMICAL COMPOSITION OF PRECIPITATION. Tellus (Uppsala), 24(2):122-127, 1972. 14 refs. (Presented at the IUGG, General Assembly, 15th, Moscow, USSR, Aug 1971.)

The relationship of marine and continental constituents in precipitation is considered and the values of the background concentrations for different geographical regions are defined. On the basis of these relations, conclusions are drawn concerning variations of the background contamination of the atmosphere and of the local source contribution, which depends on natural conditions and man's activity. Over the continental areas of the USSR the background level averages 30-40% of the total contamination, the local sources contribute 60-70%, of which 20-30% can be attributed to natural sources such as soil dust, and the rest to contamination of anthropogenic origin, the latter even for the most remote clean regions being about 20-30%. (Author abstract)

22595

APTIC NO. 41462

Semonin, Richard G., and John R. Adam

THE WASHOUT OF ATMOSPHERIC PARTICULATES BY RAIN. Preprint, American Meteorological Society, Boston, Mass. and Air Pollution Control Assoc., Pittsburgh, Pa., p. 65-68, 1971. 10 refs. (Presented at the Conference on Air Pollution Meteorology, Raleigh, N.C., April 5-9, 1971.)

The annual amount of aerosol removed from the atmosphere by washout was calculated for two locations. A total of 3135

cu m of rain was sampled at Island Beach State Park, N. J. and 2506 cu m at Miami, Fla. A recording rain gauge operating simultaneously with a raindrop camera was employed for measurements. From the measured results, 30 average distributions were calculated as a function of rainfall rate with Miami having a larger mean droplet diameter and strikingly fewer small droplets as compared with Island Beach. Rain fell at Island Beach 4.2% of the year and at Miami only 2.3% of the year, indicating that moderate and heavy rains were more appreciable at Miami. Collection efficiencies and raindrop size distributions were used to mathematically yield the washout coefficient for various rainfall rates and the total annual washout. The washout coefficients were larger at Island Beach than at Miami, although wider variations were introduced by the various sets of collection efficiency data used. Washout coefficients calculated from experimentally determined collection efficiencies were well below those calculated from theoretical efficiencies. An obvious extension of this work would be the calculation of the total amount of material removed from the atmosphere and the concentration of aerosol constituents in the rainwater assuming the necessary parameters for such calculations were present. Tabular data for annual washout and percent removal of atmospheric aerosols are provided for both locations studied.

22596

APTIC NO. 41561

Semonin, Richard G.

COMPARATIVE CHLORIDE CONCENTRATIONS BETWEEN MAUNA LOA OBSERVATORY AND HILO, HAWAII. J. Appl. Meteorol., 11(4):688-690, June 1972. 9 refs. (Presented at the International Conference on Condensation and Ice Nuclei, 7th, Prague, Czechoslovakia and Vienna, Austria, Sept. 1969.)

Millipore filter samples obtained at the Mauna Loa Observatory and at Hilo, Hawaii, were analyzed for chloride particle concentrations. These data were used in a transport model to determine the removal efficiency of particles. The percentage of particles removed is uniform from the shore to the mountain observatory, regardless of size. These results lead to calculations of the impaction-sedimentation ratio which range from 212 for 20-micron diameter particles to 6413 for 4-micron particles. The total impaction factors (removal by trees and other vegetation) ranged from 0.267 to 0.323 along the 60-km path. (Author abstract modified)

22597

APTIC NO. 41509

Shchelchikov, G. I.

EXPERIMENTAL INVESTIGATION OF THE LOCAL INHOMOGENEITIES OF THE MICROPHYSICAL FOG PARAMETERS OCCURRING IN THE FOG GENERATING CHAMBER. (Eksperimental'noye issledovaniye lokal'nykh neodnorodnostey mikrofizicheskikh kharakteristik тумана в камере). Text in Russian. Tr. Inst. Eksp. Meteorol., no. 20:34-43, 1971. 17 refs.

The fluctuations occurring in the fog droplet concentration by slow adiabatic cooling of saturated air in a fog chamber were analyzed, and the fluctuations were compared to those in condensation nuclei and dust concentrations. The fluctuations in the fog droplet concentration were much higher than those in the dust and condensation nuclei concentrations, which were homogeneous. The fluctuation in the concentration increased rapidly with the sample volume. The magnitude of the fluctuations were determined by concentration fluctuations rather than by size distribution fluctuations. While the fluctuation in the transparency with increased humidity from 75% to 100% was negligible (about 5%), it increased to a very high value at the moment of fog formation. Assuming the condensation nuclei concentration to be homogeneous, the fluctuations in the droplet concentration may be due to fluctuations in the supersaturation. The variations in the droplet size distribution spectra between individual samples, irrespective of the droplet concentration, were not significant.

22598

APTIC NO. 41680

Shieh, Loo J., Ben Davidson, and James P. Friend

A MODEL OF DIFFUSION IN URBAN ATMOSPHERES: SO₂ IN GREATER NEW YORK. Public Health Service, National Air Pollution Control Administration and North Carolina Consortium on Air Pollution, Proc. Symp. Multiple-Source Urban Diffusion Models, Chapel Hill, N. C., 1969 p. 10-1 to 10-39. 34 refs.

GPO

A source oriented three-dimensional model of diffusion and transport based upon the statistical concept of turbulent diffusion was developed for application to an urban area. A simple algorithm was found for computing the concentration field from time-dependent continuously emitting sources of different sizes and scales. The model was applied to the New York City metropolitan region by introducing known specific meteorological conditions and the known pollutant source distribution as input data. The validity of the model has been verified in a preliminary manner for sulfur dioxide. The results appear promising, giving concentration fields computed on spatial scales down to 0.2 mi. Continuous point and area sources are discussed. (Author abstract modified)

22599

APTIC NO. 41938

Siksnas, R.

TRIPLET (3D SIGMA-G-MINUS) AND SINGLET (1D DELTA-G, 1D SIGMA-G-PLUS) STATES OF THE OXYGEN MOLECULE O₂ AND RELATED MOLECULAR IONS. *J. Aerosol Sci.*, 2(2):229-240, June 1971. 28 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

The problems related to the triplet and singlet states of the oxygen molecule are summarized, and their importance to the understanding of the chemistry of polluted atmospheres is emphasized. Investigations of the chemistry of singlet oxygen are needed because reactions are needed to develop singlet oxygen by chemical means, reactions thought previously to involve ground state oxygen may involve singlet oxygen, and the mechanism of transfer of triplet to singlet is not understood. Singlet oxygen may play an important role as an oxidant in photochemical air pollution and in the behavior of the gases in the 50 to 100 km layers of the atmosphere.

22600

APTIC NO. 41227

Sklarew, R. C., A. J. Fabrick, and J. E. Prager

A PARTICLE-IN-CELL METHOD FOR NUMERICAL SOLUTION OF THE ATMOSPHERIC DIFFUSION EQUATION, AND APPLICATIONS TO AIR POLLUTION PROBLEMS. II: PICIF AND NEXUS COMPUTER CODE LISTING. (FINAL REPORT). *Systems, Science and Software, La Jolla, Calif., National Environmental Research Center Contract 68-02-0006, Rept. 3SR-844, 175p., Nov. 1971.*

The computer code listings for the PICIF and NEXUS codes, are presented in this volume. These codes are used in the new method for the solution of the turbulent atmospheric diffusion equation. The method called PICK, is based on the use of Lagrangian mass points and is one of a family of Particle-in-Cell techniques for the solution of partial differential equations. This volume presents code listings and flowcharts, and sample output for each code. (Author abstract)

22601

APTIC NO. 41231

Sklarew, R. C., A. J. Rabrick, and J. E. Prager

A PARTICLE-IN-CELL METHOD FOR NUMERICAL SOLUTION OF THE ATMOSPHERIC DIFFUSION EQUATION, AND APPLICATIONS TO AIR POLLUTION PROBLEMS. III: NEXUS/P OPERATIONS MANUAL. (FINAL REPORT). *Systems, Science and Software, La Jolla, Calif., National Environmental*

Research Center Contract 68-02-0006, Rept. 3SR-844, 166p., Nov. 1971.

The operations manual is presented for the NEXUS/P code for the PICK method. The PICK method, which is used for the solution of the turbulent atmospheric diffusion equation, is based on the use of Lagrangian mass points and is one of a family of Particle-in-Cell techniques for the solution of partial differential equations. The manual presents a detailed description of each subroutine in both SETUP and NEXUS/P, together with a listing of the code and a computer generated flowchart. The computer listings are in IBM 360 compatible FORTRAN IV. (Author abstract)

22602

APTIC NO. 41651

Sklarew, R. C., A. J. Fabrick, and J. E. Prager

THE PARTICLE-IN-CELL METHOD FOR NUMERICAL SOLUTION OF THE ATMOSPHERIC DIFFUSION EQUATION, AND APPLICATIONS TO AIR POLLUTION PROBLEMS. VOLUME I. (FINAL REPORT). *Systems, Science and Software, La Jolla, Calif., National Environmental Research Center Contract 68-02-0006, Rept. 3SR-844, 173p., Nov. 1971. 34 refs.*

NTIS: 209290

The PICK particle in cell method for solution of the atmospheric dispersion equation was developed, tested, and applied to air pollution problems. The PICK method for simulating atmospheric advection and diffusion was more accurate and reliable than the finite differences method. PICK can be used to simulate carbon monoxide and, in conjunction with a chemical subroutine, was used to simulate photochemical smog. The PICK method, being a hybrid Lagrangian-Eulerian method, offers a unique capacity to assess the importance of the errors introduced by the use of Eulerian cell concentrations in chemical cell simulation. Due to the accuracy of advection with the PICK method, it may also make a significant contribution to hydrodynamic modeling for meteorological applications. The computer program is discussed. (Author summary modified)

22603

APTIC NO. 41499

Tanizawa, H., A. Watanabe, S. Wakamatsu, and K. Itsu

ANALYSIS OF POLLUTION CONCENTRATION FACTORS. (Nodoji keiretsu no kaiseki). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):13, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The measurement records of sulfur dioxide and suspended particulates from six cities (17 monitoring stations) were used to analyze factors influencing pollution concentrations. In this report, emission quantity and emission source distribution were specially investigated. The effect of the concentration at emission sources upon quantitative distribution was examined. The winter season data were separated into those from weekdays and Sunday-holidays. The urban-type pollution such as that found in Sapporo or Tokyo shows a clear differentiation in distribution between weekdays and holidays. Fewer emission sources operate over holidays and the quantity distribution is less. In industrial cities such as Muroran and Kitakyushu, there is almost no difference between holiday and weekday distributions. In industrial city pollution, the distribution pattern is determined by the position of emission sources and seasonal wind direction frequency. In urban-type pollution, the fluctuation of the emission quantity at the emission sources determines the distribution pattern. Linear relationships were arrived at mathematically, by obtaining variants of average values, correction, and dispersion.

22604

APTIC NO. 41500

Tanizawa, H., A. Watanabe, S. Wakamatsu, and T. Toyoguchi. STATISTICAL FEATURES OF LOCAL POLLUTION. (Chūki osen no tokeiteki keitai ni tsuite). Text in

Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):14, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Using the data from continuous measurements of sulfur dioxide concentrations in various cities, factors for the high concentration frequency were analyzed. The data from Tokyo, Osaka, Sapporo, and Muroran were examined, and the patterns of high concentration frequency with regard to time and location were obtained. From the cumulative figure distributions during winter months (Oct.-March) in four cities, 95% figures were 27, 13, 10, and 21 ppm, respectively. In general, about 33% of the high concentration appeared about 8 to 9 am in Sapporo, Osaka, and Tokyo. In Sapporo, a small peak appeared in the evening, which coincided with the peak figure of fuel consumption for domestic heating. Muroran, which is an industrial city, showed no time differentiation. In Sapporo, frequent high concentrations appeared when the wind direction was southeast.

22605

APTIC NO. 42145

Time, N. S.

AN ESTIMATE OF THE TURBULENCE SPECTRUM IN THE DISSIPATION RANGE FROM MEASUREMENTS OF LASER RADIATION FLUCTUATIONS. (*Otsenka spektra turbulentsosti v intervalle dissipatsii po izmereniyam fluktuatsiy lazernogo izlucheniya*). Text in Russian. *Izv. Akad. Nauk SSR. Fiz. Atmosfery i Okeanu, 8(1):90-92, Jan. 1972. 7 refs.*

Turbulence spectra were determined in the dissipation range from measurements of laser radiation fluctuations, and compared to theoretical spectra to estimate the applicability of certain hypotheses. The measurements were carried out in a 50-meter range at a wavelength of 0.63 micron. The perpendicular wind speed component was 3-5 m, and the angle between the wind direction and a perpendicular to the measuring path was within 30 deg. Best accordance between the calculated and experimental spectra was found for the case where the minimum dimension of the inhomogeneities of the refractive index was 1.2 mm. The analysis of the spectral density of the fluctuations of the light wave intensity logarithm is a method of high sensitivity for small-scale investigations. The considerable distortions in the high-frequency component of the spectrum obtained do not permit reliable conclusions to be drawn.

22606

APTIC NO. 41030

Tisone, Gary C.

MEASUREMENTS OF THE ABSORPTION OF SOLAR RADIATION BY O₂ AND O₃ IN THE 2150 Å REGION. *J. Geophys. Res., 77(16):2971-2974, June 1, 1972. 10 refs.*

Simultaneous measurements of absorption of the solar radiation in the wavelength regions of 2150 and 2500 Å as a function of altitude between 53 and 68 km were made. These measurements have been used to obtain ozone densities and to obtain an absorption cross section for oxygen at 2150 Å. The cross section of 0.78 times 10 to the negative 23 sq cm that was obtained is in agreement with the value of 180 times 10 to the negative 23 sq cm obtained from laboratory measurements. (Author abstract)

22607

APTIC NO. 40972

Twomey, S.

MEASUREMENTS OF THE SIZE OF NATURAL CLOUD NUCLEI BY MEANS OF NUCLEPORE FILTERS. *J. Atmospheric Sci., 29(2):318-321, March 1972. 7 refs.*

The size of cloud nuclei acting at 0.75% supersaturation was estimated by using varying flow rates through Nuclepore filters to discriminate between different sizes. The nuclei, sampled in clean continental and maritime air at Robertson, New South Wales, were small, not much greater than the theoretical minimum radius of approximately .000001 cm permitted by nucleation theory. The result agrees quite well with previous

estimates of cloud nucleus size from experiments carried out at Chesapeake Bay, Maryland. Atmospheric residence time of cloud nuclei cannot be more than a few days, and the cloud nuclei must be composed entirely or partly of a water soluble material since an insoluble particle of such a small size could not nucleate condensation at supersaturations of the order of 1% or less. (Author abstract modified)

22608

APTIC NO. 41667

Twomey, S.

THE DETERMINATION OF AEROSOL SIZE DISTRIBUTIONS FROM DIFFUSIONAL DECAY MEASUREMENTS. *J. Franklin Inst., 275(2):121-138, Feb. 1963. 9 refs.*

The decay of a heterogeneous population of particles such as occurs when a heterogeneous aerosol is decaying by diffusion of particles to the containing walls may be used to estimate the distribution function of the heterogeneous population. By making observations as the decay proceeds, it is possible to obtain a decay curve which is the Laplace transform of that distribution function which relates the number of particles to the diffusion coefficients of the particles. The decay curve has been evaluated for a number of hypothetical distributions. With the decay curve as a starting point, it is possible to obtain a numerical inversion of the transform which yields the distribution function with fair accuracy. (Author abstract)

22609

APTIC NO. 41535

Uchida, Shunichi

UTILIZATION OF RESOURCES AND PROTECTION OF THE ENVIRONMENT IN HIGH DENSITY AREA. FINDINGS AND RECOMMENDATIONS BASED ON STUDY OF THE LOWER ATMOSPHERE AND TERRAIN VEGETATION IN THE SOUTH KANTO PLAIN. *Ministry of International Trade and Industry (Japan), Public Nuisance Resources Research Inst., 27p., May 1972. 2 ref. (Includes A SUPPLEMENT OF MAPS, CHARTS, AND PHOTOGRAPHS, 13p.)*

There have been many improvements in comprehensive observations and analysis techniques in meso-climatology in and around cities, and in using remote sensing to analyze and survey terrain, vegetation, and land. Some of these techniques were used in studies of the lower atmosphere in the eastern Kanto Plain and preservation of terrain vegetation in an urban environment. Concentrated pollution over a wide area exists only in a limited section of the atmosphere. The movement of air in the lowest layer of this section is minimal. When there is little air flow between this and surrounding parts of the atmosphere, a state called a closed structure is created. When southern Kanto is subjected to a closed structure, local air circulation is influenced by several wind patterns. The distribution of pollution is confined almost entirely to an area within the sea and land breeze pattern of Tokyo Bay. The synoptic climate responsible for the prevalence of a closed structure over long periods comprises: a low layer of cold air accompanying a front from May through July; ground inversion in winter; sub-tropical anticyclones in summer; and continued presence of a high pressure belt. Sulfur dioxide was chosen as an index for measuring the quantity and distribution of pollution. Emissions were 2083 tons/day in summer and 2493 tons/day in winter. The SO₂ index and plant life indexes, can be used in measuring the relationship between pollution and weather. Seven trees were chosen for measuring the vitality index: shiia shi-boldai, zelkova; black pine, red pine, ginkgo, prunus yedensis, and cedar. The results of these studies are discussed. A comparative analysis of infrared color photographs covering a 50 km wide area passing through the center of Tokyo from east to west shows where environmental pollution has worsened and a decrease in the area of vegetation due to contamination. Recommendations are made concerning: the gathering of statistics; observation, analysis, and measurement; investigation and research; control methods; and land use and public support.

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Varkonyi, Tibor

REGIONAL DISTRIBUTION OF ATMOSPHERIC SULFUR DIOXIDE IN HUNGARY. (A legkörü környezeti megoszlása Magyarországon Repulogépes vizsgálattal). Text in Hungarian. *Energia Atomtech. (Budapest)*, 25(4):164-169, 1972. 14 refs.

A continuously registering gas analyzer carried by airplane has been economically applied for a quick survey of sulfur dioxide in Hungary. A registering instrument of the Wosthoff type was carried on radial routes from Budapest at altitudes of 1000 and 2000 m; the survey lasted 3 days. The distributions of SO₂ were contoured and indicated industrial concentrations in Northern Transdanubia and Borsod; Southeastern Hungary had the cleanest air. Concentrations are higher over towns than elsewhere, but do not influence the regional patterns. The vertical distribution from 100 to 2000 m over clean fields was nearly constant to a maximum at 500 m, followed by a rapid decrease. Over an inversion at 1500 m, the air contained only 25-60 microgram SO₂/cu m. The extreme values measured in the survey were 49 and 182 micrograms SO₂/cu m.

22611

APTIC NO. 42146

Vekris, S. L.

DISPERSION OF COAL PARTICLES FROM STORAGE PILES. *Ont. Hydro Res. Quart.*, 23(2):11-16, 1971. 3 refs.

The dispersion of dust from a large coal pile has been examined and a theory developed for calculating the deposition at distances of a few thousand meters. Three phases are involved in the process: generation of airborne dust; dispersion by eddy diffusion; and deposition by gravitational settling and precipitation washout. The amount of material deposited is a function of distance, wind speed, atmospheric stability, emission rate, and particle size. The dust raised by vehicular movement was estimated from concentration measurements made close to the pile surface, and the theory was used to calculate depositions based on this value. Results suggest that, on rare occasions, coal-dust deposition could be a major source of dustfall. At times when such episodes could occur, it is important that precautionary measures, such as the spraying of the pile surface with water, be undertaken. (Author abstract modified)

22612

APTIC NO. 41746

Watt, Arthur D.

PLACING ATMOSPHERIC CO₂ IN PERSPECTIVE.

IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 8(11):59-72, Nov. 1971. 32 refs. (Presented at the Westinghouse School for Environmental Engineering, 1st, Fort Collins, Colo., June 15-July 10, 1970.)

Man introduces 20 billion tons of carbon monoxide into the atmosphere each year. This constitutes 10% of the annual CO₂ budget and 1% of the total atmospheric CO₂. Two-thirds of man's input to the atmosphere is being removed by an undetermined scrubbing mechanism. The CO₂ has increased by 40 ppm in the last century and is currently increasing by 0.75 times 10 to the 10th power tons/yr. Man can tolerate 15 times the present level. Plants are known to benefit from increased CO₂ up to 100 times present levels. Global climatic effects remain the only significant area of concern. Large spatial and temporal variations exist in global CO₂ distribution as a response to temperature, atmospheric pressure, and biologic activity. Since plant uptake increases almost directly with CO₂ concentration, global temperature increase should be self-regulated by increased plant activity, and stabilization of the atmospheric CO₂ level should result. The CO₂ does not uniformly back-radiate infrared energy from the earth. Very limited portions of the radiation spectrum are effected by atmospheric CO₂. Doubling atmospheric CO₂ will only slightly increase global temperature. The stratosphere is cooled by infrared radiation to space from CO₂ and ozone. Normally the stratosphere is in radiative equilibrium. Other factors such as

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dust, may override any CO₂ effect. It appears that atmospheric CO₂ variations can have only a minor effect on global temperature.

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APTIC NO. 41940

White, D. R. and J. L. Kassner, Jr.

EXPERIMENTAL AND THEORETICAL STUDY OF THE SIGN PREFERENCE IN THE NUCLEATION OF WATER VAPOR. *J. Aerosol Sci.*, 2(2):201-206, June 1971. 20 refs. (Presented at the Colloquium on the Physics and Chemistry of Aerosols, Fontenay-aux-Roses, France, Sept. 24-25, 1970.)

The nucleation of water vapor on ions in atmospheres of helium and argon was studied using an expansion type cloud chamber. Separation of the positive and negative ions was achieved so that the nucleation could be studied as a function of the sign of the ionic charge and the supersaturation. A semiphenomenological theory was developed as an extension of the classical liquid drop theory to include the effect of the ionic charge on the nucleation process. The theoretical model of the prenucleation embryo was assumed to possess an oriented dipole surface layer with the direction of orientation dependent on the sign of the ionic charge. The theory predicts the increase in the nucleation rate compared to that for homogeneous nucleation and a difference in rate between positive and negative ions, the negative ions having the higher nucleation rate. It also predicts a correction term to the classical theory of homogeneous nucleation for polar molecules which exhibit an electrical double layer at the liquid surface. Comparison of the theoretical and experimental results for nucleation on positive and negative ions yields good agreement and indicates that the prenucleation embryo is probably a tightly bonded highly structured cluster possessing an oriented dipole surface layer. (Author abstract modified)

22614

APTIC NO. 40955

Woods, J. D., J. C. Drake, and P. Goldsmith

COALESCENCE IN A TURBULENT CLOUD. *Quart. J. Roy. Meteorol. Soc. (London)*, 98(415):135-149, Jan. 1972. 26 refs.

The collision efficiency of small droplets is significantly increased when the interacting drops fall through a laminar shear flow of about 10/sec. The structure of microturbulence in clouds is considered; shears of this magnitude are likely to occur only within a narrow spectral band. This peak in the shear spectrum occurs at a scale that is much larger than the interaction distance of cloud droplets having radii of about 20 micron. Hence it is a good approximation to describe droplet collisions in a turbulent cloud as though they occurred in a steady laminar shear flow. This enhanced droplet coalescence in turbulent clouds may account for the observed development of large cloud droplets in cumulus clouds at rates greater than can be explained by condensation and the efficiency of still-air coalescence. (Author summary modified)

BASIC SCIENCE AND TECHNOLOGY

22615

APTIC NO. 42012

OXYGEN MEASUREMENT IN WASTE GASES.

(Sauerstoffmessung in Abgasen). Text in German. *Motor- tech. Z. (Stuttgart)*, 33(6):262, June 1972.

The new Beckmann oxygen flue gas sampling system can be used in all cases where natural gas, fuel oil, or other fuels with a low sulfur content is used. An unheated version is available which can be used at an ambient temperature of above 0 C. The heated version is installed in a water and dust proof casing. It can be used at temperatures down to -30 C. The sample is drawn through a vortex tube and cooled. The condensing water flows off and the cooled sample gas is passed to the ox-

xygen sensor which operates according to the polarographic measurement method. It has a gold cathode and a silver anode. Both electrodes are connected with each other by way of an electrolyte. A thin teflon-membrane separates the samples from the electrolyte. Oxygen that passes through the membrane is reduced at the cathode. The current produced at this process is directly proportional to the oxygen concentration in the waste gas. The analyzer can be manually switched to the measurement ranges 0 to 1, 0 to 5, 0 to 10, or 0 to 25 % oxygen.

22616

APTIC NO. 41038

Abo, Toshio and Teizo Watanabe

PYROLYSIS GAS CHROMATOGRAPHY OF LOW HYDROCARBON COMPOUNDS AND POLYETHYLENE. (*Teibunshi tanka suiso to poriechiren no netsu bunkai gasu kuromatogurafi*). Text in Japanese. *Kogyo Kagaku Zasshi (J. Chem. Soc. Japan)*, 74(5):885-888, May 1971. 11 refs.

Hydrocarbons with 5-36 carbon atoms on the direct chain were analyzed at 550 to 750 C in order to clarify the pyrolysis mechanism of low molecular hydrocarbons, and gas chromatography was applied. The results were compared with formulas derived from the theory that thermal decomposition occurs by random breakage of carbon chains. Random thermal decomposition did occur, and as secondary reactions, depolymerization and intra-molecular hydrogen rearrangement occurred. Thermal decomposition of polyethylene is also a random reaction, but at the low temperature of 600 C, the alkyl radicals which form at the early stage of reaction are not yet gasified; therefore, intramolecular hydrogen rearrangement occurs more easily in this form than in the form of gasified low hydrocarbon.

22617

APTIC NO. 41022

Alcock, C. B.

REPRESENTATION OF EQUILIBRIA IN METAL-SULPHUR-OXYGEN SYSTEMS BY A CHEMICAL POTENTIAL DIAGRAM. *Can. Met. Quart.*, 10(4):287-289, Oct.-Dec. 1971. 4 refs.

A simplified graphical method of representing solid-gas equilibria in metal-sulfur-oxygen systems is described. The diagrammatic representation makes use of the chemical potentials which coexist with gaseous sulfur oxides at a given temperature, and condensed phase metal-oxide, sulfide, and sulfate equilibria. With this method much more information about the isothermal behavior of metal-sulfur-oxygen systems with respect to their thermodynamic properties can be represented on one diagram than is possible by means of stability diagrams. The chemical potential diagram can also be used over a wide temperature range. (Author abstract modified)

22618

APTIC NO. 41484

Avramenko, L. I. and R. V. Lorentso

REACTIONS OF HYDROXYL WITH MOLECULES OF DIFFERENT GASES. II. REACTIONS OF FREE HYDROXYL WITH HYDROGEN AND CARBON MONOXIDE. (*Reaktsii gidroksila s molekulami razlichnykh gazov. II. Reaktsii svobodnogo gidroksila s vodorodom i okis yu ugleroda*). *Zh. Fiz. Khim.*, 24(2):207-212, 1950. 8 refs. Translated from Russian. 13p.

A new, more general, and more exact formula was derived for calculating the rate constants of elementary reactions of hydroxyl. Based on spectrographic measurements, the rate constants for the reaction of hydroxyl with hydrogen and with carbon monoxide were computed. (Author abstract modified)

22619

APTIC NO. 41543

Badoz-Lambling, J., M. Herlem, A. Thiebault, and G. Adhami
THE REACTIONS OF SO₃ AND SBF₃ WITH FLUOROSULFURIC ACID. *Anal. Letters*, 5(5):305-307, 1972. 5 refs.

Fluorosulfuric acid is a good donor of sulfur trioxide, and as a result it reacts with antimony pentafluoride to give hydrogen antimony hexafluoride and SO₃. Solutions of SO₃ and SBF₃ in HSO₃F exhibit the same cathodic waves at platinum and platinized platinum electrodes. Electrochemical reductions at a potential corresponding to the plateau of these waves produces S sulfur dioxide and not hydrogen gas. This work confirms previous experimental evidence for the formation of SBF₆ and SB₂F₁₁ ions on the basis of 19F nonmagnetic radiation spectra of SbF₃-HSO₃F solutions. (Author abstract modified)

22620

APTIC NO. 41448

Bechert, Dietrich and Eberhard Pfizenmaier

ON THE DISCHARGE CONDITION AT THE TRAILING EDGE OF A NOZZLE IN A WEAK UNSTEADY JET FLOW. (*Ueber die abflussbedingung an der Duesenaustrittskante bei einer schwach instationaeren Duesenstromung*). Text in German. *Forschungsber. Deut. Luft Raumfahrt*, no. 71-09, 34p., 1971.

NTIS: N72-15294

The Kutta condition of a weakly nonstationary jet flow, leaving the trailing edge of a nozzle, was investigated. For this purpose, velocity measurements were done in a jet flow with acoustical perturbation. Hot wire probes and probe microphones were used. The experimental results showed no singularity of the nonstationary part of the velocity at the trailing edge of the nozzle as it would occur in the absence of a stationary jet flow. Furthermore the nonstationary perturbation produced no constant deformation of the jet boundary.

22621

APTIC NO. 41005

Burrow, P. D. and L. Sanche

ELASTIC SCATTERING OF LOW-ENERGY ELECTRONS AT 180 DEGREES IN CO₂. *Phys. Rev. Letters*, 28(6):333-336, Feb. 7, 1972. 13 refs.

A technique is described for the study of electrons which are elastically scattered from a gas target into a small solid angle centered at 180 deg with respect to the direction of the incident electron beam. The instrument is capable of energy resolution better than 40 meV full width at half-maximum and is useful over a wide range of impact energy. The technique was applied to electron scattering from carbon dioxide vapor at energies from 3 to 5 eV in this region the elastic cross section displays structure due to the presence of temporary negative-ion states. The series of peaks has an average spacing of 130 plus or minus 3 meV. In carbon dioxide, the cross section for backscattering exhibits the peaked structure as a greater fraction of the signal excursion than does the total scattering cross section. This allows a more accurate study of the structure than was available previously.

22622

APTIC NO. 41595

Campani, P., C. S. Fang, and H. W. Prengle, Jr.

INFRARED ABSORPTION COEFFICIENTS FOR CERTAIN POLLUTANT GASES. *Appl. Spectry*, 26(3):372-377, May/June 1972. 19 refs.

Quantitative analysis of gas mixtures by infrared spectroscopy requires a knowledge of the absorption coefficients as a function of the optical path length and temperature. For the majority of pollutant gases information is scarce or incomplete. Absorption coefficients have been determined for methane, ethylene, carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, and hydrogen sulfide. Measurements were made at room temperature and at elevated temperatures for certain wavelengths. Absorption coefficients were determined over a very wide range of optical path length. The validity of the Bouguer-Beer law was confirmed for a limiting range of path length; for longer path length, the absorption coefficient decreased and was correlated as a function of path length and temperature. (Author abstract modified)

22623

APTIC NO. 41524

Clift, R. and W. H. Gauvin

MOTION OF ENTRAINED PARTICLES IN GAS STREAMS. *Can. J. Chem. Eng.*, 49(4):439-448, Aug. 1971. 98 refs. (Presented at the POWTECH 71 (International Power Technology and Bulk Solids Conference), Harrogate, England, May 12-14, 1971.)

The drag experienced by a solid particle moving through a fluid is dependent not only on the solid and fluid properties and the relative velocity, but also upon a number of other factors including fluid turbulence, acceleration, particle shape and orientation, and particle-fluid mass transfer. Recent work on the effect of these factors on fluid-particle drag is reviewed. Although current understanding is in no sense complete, it is clear that each of these factors has a significant effect on the value of the drag force so that the use of drag coefficients measured under highly idealized conditions can be very misleading. This is particularly marked when non-idealities cause a complete change in the flow pattern around the particle, as shown by the influence of turbulence and relative acceleration in the region of the critical Reynolds number. Detailed solutions of the equations of fluid motion are leading to greatly improved understanding of fluid-particle interaction at low Reynolds numbers. However, developments have been less rapid in the higher Reynolds number regimes which are of at least equal practical interest. Some of the gaps in present knowledge have been pointed out, and possible directions for future work suggested. (Author summary)

22624

APTIC NO. 41517

Crowe, C. T., W. R. Babcock, and P. G. Willoughby

DRAG COEFFICIENT FOR PARTICLES IN RAREFIED, LOW-MACH NUMBER FLOWS. Preprint, Technion-Israel Inst. of Tech., Haifa, 28p., 1971. 42 refs. (Presented at the International Symposium on Two-phase systems, Haifa, Israel, Aug. 29-Sept. 2, 1971. Paper 3-3.)

A parameter essential to the quantitative analysis of two-phase flows is the drag coefficient of the condensed phase particles. A review of the published drag data reveals that no results are available in the important flow region delimited by Mach numbers less than two and Reynolds numbers less than 100. A microballistic range was developed and utilized to measure particle-drag forces in this flow region. The results, reduced in terms of a normalized drag coefficient, are correlated with other drag data available over a wide range of flow conditions. An algebraic equation which provides a good data fit for all Mach numbers and for Reynolds numbers less than the critical Reynolds number is presented. (Author abstract)

22625

APTIC NO. 41707

Davies, J. T.

TURBULENCE PHENOMENA AT FREE SURFACES

Am. Inst. Chem. Engrs. J., 18(1):169-173, Jan. 1972. 10 refs.

Gas absorption by eddies at the free surface of a strongly turbulent liquid is interpreted quantitatively in terms of the Levich approach. The mass transfer coefficient is calculated to vary with Re , the Reynolds number. Experiments on free turbulent jets of liquids in gas are in general accord with this theory. For turbulent films of liquids flowing over large roughness elements in wake-interference flow, the turbulence is anomalously effective in promoting gas absorption. Traces of surface-active agents suppress the surface renewal. This is analyzed theoretically; the results compare favorably with gas-absorption for stirred cells and flow experiments over smooth plates. For wake-interference flow over rough plates, the reduction in the rate of gas absorption by surface-active material is more pronounced than predicted for ordinary turbulence. Even in the presence of a surface-active agent, the roughness still gives an advantage in mass transfer rates as compared with smooth plates. (Author abstract modified)

22626

APTIC NO. 42028

Fujimoto, Kaoru, Tadashi Takahashi, and Taisei Kunugi

OXIDATION OF PALLADIUM DURING THE OLEFIN OXIDATION OVER PALLADIUM SALTS-ACTIVE CHARCOAL CATALYSTS. (Parajiumuen-kasseitan shokubai ni okesu kasseitan no sanko sayo). Text in Japanese. *Nippon Kagaku Kaishi (J. Chem. Soc. Japan)*, no. 6:1092-1097, June 1972. 10 refs.

The oxidation of reduced palladium on active charcoal during the ethylene oxidation over palladium salts-active charcoal catalysts was studied. The effect of oxygen pressure on the reaction rate was determined from the rate of oxygen adsorption using the apparatus with constant volume and constant pressure equipment. The effect of oxygen pressure became evident only when its value was very little. If it is assumed that the over-all reaction rate is determined in terms of the dynamic equilibrium between the oxidation of ethylene by palladium salts and the re-oxidation of reduced palladium compounds by oxygen, then the rate of re-oxidation represented by an equation can be derived from the analysis of experimental results. This suggests that the reduced palladium is oxidized by oxygen which is dissociatively adsorbed on active charcoal. The measure of the re-oxidation activity was found to vary with temperature, ethylene pressure, and anions. The order of re-oxidation activity of palladium salts in decreasing order was palladium nitrate, palladium chloride, palladium sulfate, under the same reaction conditions. (Author abstract modified)

22627

APTIC NO. 41446

German, N. G., A. I. Kovalev, and V. I. Eremenko

THE POSSIBILITY OF DETERMINING THE SULPHUR CONTENT OF COAL BY X-RADIOMETRY. *Coke Chem. (USSR) (English translation from Russian of: Koks i Khim.)*, no.10:18-19, 1971.

The ZAR X-radiometric ash meter uses soft X-rays in the 7-16 keV energy band. The ash meter is based on the relationship between X-ray scattering and the effective atomic number of the coal substance. The presence of a constant amount of sulfur can be determined easily. Unlike conventional ash determinations, the ash meter measures all the sulfur present. Confirmatory experimental data were obtained in the laboratory and in commercial tests. The accuracy, when compared with the usual procedures, falls well within the commercial tolerance limits. X-radiometry avoids many time-consuming stages involved in the standard procedures with an intrinsic error on only 0.19%.

22628

APTIC NO. 41641

Giese, Richard Heinrich

TABLES OF MIE-SCATTERING FUNCTIONS. PART I: MIXTURES OF DIELECTRIC PARTICLES. (Tabellen von MIE-Streufunktionen I. Gemische dielektrischer Teilchen). *Forschungsber. Bundesminst. Bild. Wiss.*, no. W 71-23, 133p., May 1971. 19 refs.

NTIS: N72 15382

A fortran IV program is described which computes light scattering functions of dielectric and absorbing spheres (Mie-theory). Average scattering functions of polydisperse mixtures of dielectric particles (refractive index 1.33; 1.5; 1.7) are presented for different size distributions in various ranges of the size parameter. The accuracy of single particle scattering functions is compared with other results and attention is drawn to the necessity to compute polydisperse mixtures by very small steps of the size parameter to be used in the numerical integration.

22629

APTIC NO. 41222

Goodrich, John C. and Gail Howrigan

COMPUTER MAPPING AS AN AID IN AIR POLLUTION STUDIES. VOLUME TWO: INDIVIDUAL REPORTS. REPORT K: COMPUTER PROGRAM MANUALS. Har-

vard Univ., Cambridge, Mass., Graduate School of Design, National Air Pollution and Control Administration Grant 68-240SD, Rept. APTD-0738, 262p., June 1971.

NTIS: PB 204713

A computer program (SYMAP) for producing maps which depict quantitative and qualitative information is discussed. One or more of three basic types of maps may be produced. The contour map is based on the use of isolines to establish a data surface. The conformant map is best used for data whose areal limits are significant. Each data zone is surrounded by a boundary whose edges are conformant to some predefined spatial element. The proximal map defines, by nearest neighbor methods, the spatial limits on point information. The major feature of the SYMAP program is the availability of electives that add to the flexibility. Provisions are made for flexibility of size, scale, and class interval, as well as provisions for histogram bars and text. Other elective packages depend on the type of map chosen and include boundary coordinates, data coordinates, legends, and a manipulative values package.

22630

APTIC NO. 41898

Hamamura, Takuya, Yoshito Onishi, and Yosuo Iizuka
THE CATALYTIC OXIDATION OF CARBON MONOXIDE ON ZIRCONIUM DIOXIDE. *Bull. Chem. Soc. Japan (Tokyo)*, 45(5):1288-1291, May 1972. 9 refs.

The catalytic oxidation of carbon monoxide on zirconium dioxide was kinetically examined in order to compare with the results of oxidation by titanium dioxide. The experiment was carried out under gas pressures of 0.01-100 mmHg at 400-550°C. The reaction rate was proportional to the relative pressure of CO and did not depend upon the relative pressure of oxygen; there was no retarding effect by carbon dioxide. The rate constant of this oxidation reaction almost agreed with that of the reduction of zirconium dioxide by carbon monoxide. The reaction mechanism could be explained in the same manner as that on titanium dioxide. The catalytic activity of zirconium dioxide for this reaction was almost the same as that of rutile. The activation energy at about 12.5 kcal/mol. was intermediate between those of anatase and rutile. The same relation was obtained in the activation energies of the thermal desorption of surface oxygen from these catalysts. (Author abstract modified)

22631

APTIC NO. 41700

Harada, Seiichi
PETROLEUM SULFUR CONTENT METER. (*Sekiyu Jukei ni tsuite*). Text in Japanese. *Nenryo Oyobi Nensho (Fuel and Combustion)*, 39(5):417-425, May 1972.

Sulfur content meters for continuous detection at high accuracy are described. The theory of this device is based on the decrease of radiation intensity when passed through a solution; the resulting intensity depends on the composition of the solution. A uni-energy X-ray source of 20 KeV was developed by directing a gamma-ray of 60 KeV emitted from Americium-241 on a special metal target. The sulfur content meter can be used for the measurement of total sulfur content of heavy oil or for the control of desulfurization in petroleum purification and the control of fuel blenders and heavy oil blenders at an oil refinery. The details of individual application are examined.

22632

APTIC NO. 41798

Hayden, Don W. and Douglas C. McCain
CALCULATION OF g VALUES FOR O₃(-), NO₂(2-), and NF₂. *J. Chem. Phys.*, 57(1):171-174, July 1, 1972. 13 refs.

Electron spin g values were calculated for the isoelectronic pi radicals ozonide (-), nitrogen dioxide (2-), and nitrogen difluoride using an SCF Hartree-Fock type approach with a minimum basis set of Slater type orbitals and a number of excited states for each species. The results show fair agreement with experimental data. In addition, some new experimental data are reported for the ozonide ion, O₃(-). (Author abstract)

22633

APTIC NO. 41067

Hinkley, E. D., A. R. Calawa, P. L. Kelley, and S. A. Clough
TUNABLE-LASER SPECTROSCOPY OF THE $\nu(1)$ BAND OF SO₂. *J. Appl. Phys.*, 43(7):3222-3224, July 1972. 12 refs.

Individual transitions of the $\nu(1)$ vibration-rotation band of sulfur dioxide in the 8.7 micron wavelength region have been observed, using tunable semiconductor diode lasers, and compared with theoretical calculations based on pure-rotation data from microwave absorption measurements. A new value of 1151.71 plus or minus 0.01/cm has been found for the $\nu(1)$ -band center. Pressure-broadening coefficients and intensities of individual lines were determined from the high-resolution data, and a value was obtained for total band intensity. (Author abstract)

22634

APTIC NO. 41589

Innes, K. K.
INFERENCE OF FORBIDDEN CHARACTER IN THE 2000 Å TRANSITIONS OF THE N₂O AND OCS MOLECULES. *J. Mol. Spectr.*, 42(3):575-576, June 1971. 13 refs.

Using conventional Herzberg-Teller theory in combination with recent findings indicating large effects of temperature on the f-values of the rather weak absorption systems with maxima at 1850 angstroms for nitrous oxide and at 2250 angstroms for carbonyl sulfide (OCS), observed intravalence transitions of these simple polyatomic molecules were investigated. Diffuseness of their gas phase absorption spectra masks clues to the correct assignments of excited electronic states of these species. A shift of each system maximum to lower frequencies as the temperature is raised is the effect predicted for vibrationally induced intensity rather than for allowed electronic transitions. The electronic transitions probably are forbidden and because the OCS absorption region exceeds 1 e.v., either the geometry change is appreciable or two electronic transitions are encompassed by the single maximum. The simplest interpretation for each molecule is in terms of a single forbidden electronic transition, perhaps excited molecules linear

22635

APTIC NO. 42180

Kakishima, Shinzi
WIND TUNNEL EXPERIMENT ON ASCENT HEIGHT OF EXHAUST GAS. (*Haishutsu gasu no joshu takasa ni kansuru fudo jikken*). Text in Japanese. *Denryoku Chuo Kenkyusho Gijutsu Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. Electric Power Ind., Rept.)*, no. 71053, 23p., Jan. 1972. 23 refs.

The results of wind tunnel tests on the ascent height of gas exhausted from thermal power plants and nuclear power plants are reported referring to down-washing and down-draught and to the effects of stack type on ascent height. The propriety of the amended Bosanquet II formula which has been determined by the field test to estimate ascent height of exhaust gas from thermal-power plants was proved. But further investigations are necessary for the meteorological condition of low wind speed or thermally unneutral conditions. Exhaust gas yields a pair of vortexes and they seem to influence the ascent height, so the existing theory should be corrected taking this effect into consideration. Down-washing does not occur when the ratio of exhaust gas speed and wind speed is more than about 2. Down-draught by the existence of structures, is not necessary to consider except for nuclear-power plant of the PWR type. The two and half times rule which is generally used to avoid down-draught is too conservative to apply to exhaust gas from power plants. Holland's formula used in safety analysis of nuclear power plants estimates ascent height of exhaust gas is too small. (Author summary modified)

22636

APTIC NO. 41712

Kasaoka Takemitsu, Naotake Tsumaki, and Joko Kitamura

REDUCTION SPEED (BY CARBON MONOXIDE AND HYDROCARBONS) OF NITROGEN OXIDES: EXAMINATIONS USING COPPER COPRECIPITATION CATALYSTS. (*Sanka chisso no issanka tanso, tanka suiso ni yoru kangen sokudo- dokei kyochin shokubai ni yoru kento*). Text in Japanese. Preprint, Japan Society of Chemical Engineering Tokyo, p. 74-76, 1972. 2 refs. (Presented at the Japan Society of Chemical Engineering Annual Meeting, 37th, Nagoya, Japan, 1972.)

The speed of reduction of nitrogen oxides by coexisting carbon monoxide and hydrocarbons was studied using cupric oxide and a mixture of metal oxides. Mixtures of nitric oxide, CO, and nitrogen of NO, CO, and nitrogen were passed through a tube packed with the catalyst. The CO formed was absorbed by soda lime and measured, and the NO conversion rate was calculated. For the NO(1%)-CO(2%)-N₂(97%) system, that rate of NO conversion was fast at high temperature for most of the catalysts used. The rates were also fast at lower temperature for CuO-chromium oxide and CuO-alumina. For the NO-CmHn-N₂ system, benzene showed the highest NO conversion rate; ethylene was next and methane was lowest when either CuO-Al₂O₃ or CuO-Cr₂O₃ was used as catalyst. With CuO-Al₂O₃ as catalyst, the sequence, in decreasing order of effectiveness was, toluene, benzene, ethylene, n-octane, n-hexane, and methane. The apparent activation energy of the hydrocarbon system was 25-28 kcal/mol the CO system had much higher reaction rate than the hydrocarbon system.

22637

APTIC NO. 41058

King, W. T. and Bryce Crawford, Jr.

THE INTEGRATED INTENSITY OF THE NITRIC OXIDE FUNDAMENTAL BAND. *J. Quant. Spectro. Radiative Transfer*, 12(3):443-447, March 1972. 19 refs.

The integrated intensity of the nitric oxide fundamental band at 1875/cm was measured by the Wilson-Wells method. In this method, the intensity is given by the initial slope of a Beer's Law plot in which the integrated absorption coefficient for a pressure broadened band is plotted against the optical thickness, pressure times path length, or some other suitable concentration-length unit. The intensity of this band was 135 ± or 5/atm sq cm (S.T.P.), in good agreement with the intensity found by other experimental methods.

22638

APTIC NO. 41001

Krasavtsey, N. I., I. L. Povkh, V. G. Fedorina, and E. F. Syrovatskii

THERMODYNAMICS OF THE REDUCTION OF IRON FROM MOLTEN OXIDES GASES. 1. (*Termodinamika vosstanovleniya zheleza iz zhidkikh okislov gazami soobshcheniye 1*). Text in Russian. *Izv. Vysshikh Uchebn. Zavedenii, Chernaya Met.*, 14(12):5-8, 1971. 5 refs.

Equations for the calculation of the minimum amount of combustion gas necessary for the reduction of molten iron oxides were derived. The theoretically necessary amount of gas for a given carbonaceous gaseous fuel depended on the coefficient of excess oxygen in the gaseous mixture. When the coefficient was greater than the critical coefficient, the reaction cannot be quantified. The calculation of the reduction of an iron oxide by the combustion products of natural gas is given as an example.

22639

APTIC NO. 41969

Krezenski, Daniel Charles

COMPETITIVE REACTION OF O(3P) WITH OZONE AND CARBONYL SULFIDE. *Pennsylvania State Univ., University Park, Dept. of Physical Science, Thesis (Ed.D.)*, Ann Arbor, Mich.: Univ. Microfilms, Inc., 1971. 56p. 20 refs.

The competitive reaction of the ground state oxygen atom, O(3P), with ozone and carbonyl sulfide was investigated in the temperature range 197-299 K. Mixtures of O₃ and COS were irradiated with wavelengths exceeding 4300 Å to study the disappearance of O₃ via oxygen atom attack. The relative rate constants for the reactions between O(3P) and O₃ or COS were determined independent of irradiation time, absorbed intensity, and the addition of a foreign gas. The photolysis of ozone and nitrous oxide is considered, as well as previous investigations of the rate of reaction of O(3P) with O₃, COS, and 2-trifluoromethylpropene.

22640

APTIC NO. 42128

Kuehn, D. G. and L. M. Chanin

POSITIVE ION SPECIES AND DEGREE OF DISSOCIATION OF SO₂ IN DC DISCHARGES OF HE-SO₂ MIXTURES. *J. Appl. Phys.*, 43(2):339-344, Feb. 1972. 20 refs.

Positive ion sampling measurements were conducted on direct current discharges containing 0.33% and 1.2% sulfur dioxide in helium. Ions from SO₂ include positively charged sulfur, atomic oxygen, molecular oxygen, sulfur monoxide, sulfur dioxide, and sulfur trioxide. Studies were made of the functional dependencies on gas pressure and discharge current. Interpretation of these results led to the conclusion that appreciable dissociation of SO₂ occurred within the discharge, and this hypothesis was confirmed by sampling the neutral gas components with and without a discharge. The degree of dissociation increases with discharge current and reaches a limiting value which is relatively constant over the pressure range studied. For 1.2% SO₂ in He, the degree of dissociation can become as large as 80% at 6.5 Torr and for a 20-mA discharge current. An appreciable fraction of the dissociated particles is in the form of SO. (Author abstract modified)

22641

APTIC NO. 41899

Lindt, Jan Tomas

TIME DEPENDENT MASS TRANSFER FROM SINGLE BUBBLES. *Technische Hogeschool, Delft (Netherlands), Thesis (Ph.D.)*, 1971. 128p. 90 refs.

NTIS: N72-15282

The physical and chemical mass transfer processes that develop when a single bubble rises in a non-degassed stagnant liquid were analyzed. Using a system in which carbon dioxide is absorbed in an aqueous buffer solution. Experimental data on physical and chemical absorption were obtained under similar physical conditions. The experimental technique provided accurate information on the instantaneous mass transfer rates from and velocities of the bubble. A hydrodynamic analysis is presented to provide qualitative physical insight into the periodic fluctuations in rise velocity of the bubble between 0.5 and 1.5 cm equivalent diameter and considers questions on wake structure. Mass transfer to the vortex wake region is postulated to take place by means of small scale eddies generated by the helical vortex within the captive liquid. A new theory is suggested to explain the mass transfer coefficients in the bubble wake region. The time dependent behavior of the overall mass transfer coefficient is explained on the basis of the combined effects of absorption and desorption, the intensity of which is affected significantly by the wake structure: the thinner the captive wake, the more pronounced the effect of time dependence. The gradual development of a steady nonzero concentration of solute in the wake occurs but is incapable of explaining the time dependence entirely. (Author summary modified)

22642

APTIC NO. 41571

Magi, M.

CARBON-13, NITROGEN-14, AND OXYGEN-17 NMR SPECTRA OF AROMATIC NITRO COMPOUNDS. (*Spektry YaMR aromaticheskikh nitrosoyedineniy na yadriakh C13, N14 i O17*). Text in Russian. *Eesti NSV*

Tead. Akad. Toim., Keem., Geol., 20(4):364-366, April 1971. 5 refs.

Nuclear magnetic resonance spectra of carbon-13, nitrogen-14 and oxygen-17 for a series of nitrobenzenes, nitrophenols, and nitroanilines were studied. The additivity of substituent-induced effects characteristic for the meta- and para-substituents of the benzene ring did not apply to electron acceptor substituents such as the nitro-group or to cases in which a nitro and an electron donor amino-group occurred simultaneously on the ring. The presence of an electron acceptor group on the aromatic ring appeared to enhance the donor properties of the electron donor substituents. According to the C-13 shifts of the ortho-carbons of two para-substituents, both the donor properties of amino or hydroxide and the acceptor properties of the nitric oxide group appeared to be enhanced. The shifts of the O-17 of the NO₂ group and that of N-14 of the HN₂ group with respect to the corresponding shifts in meta-nitroaniline constitute a valid criterion in the evaluation of NO₂ and NH₂ group interactions occurring in the para-nitroaniline molecule. The generation of an intramolecular hydrogen bond in ortho-nitrophenol and ortho-nitroaniline is reflected in the considerable deviations from additivity of the substituted carbon atom shifts.

22643

APTIC NO. 42033

Mascini, Marco and Claudio Botre

A METHOD FOR THE PREPARATION OF GAS MIXTURES WITH KNOWN POLLUTANT CONCENTRATIONS. (*Un metodo di preparazione di miscele gassose a concentrazione nota di composti inquinanti*). Text in Italian. *Inquinamento*, 14(2):24-28, March 1972. 5 refs.

Gas mixtures with known trace concentrations of gaseous constituents are needed for the checking of the accuracy of various analytical methods. A preparation method developed in 1966 by the Dept. of Health, Education and Welfare is described which uses sealed permeable teflon tubes filled with gas in a liquid state as a source of the trace gas desired. Permeation depends on the diffusion of the gas through the vial and subsequent evaporation from its outer surface. The principal force in this process is the difference of partial pressures between the internal and the external wall of the teflon vial. Gas concentrations which can thus be obtained range from 0.01 to 100 ppm depending on thickness of the teflon tube, its length, temperature, flux of the diluent gas, subsequent dilution, and on other factors. The trace gas concentration decreases with increasing tube wall thickness and diluent flow. In practice the vial is introduced into a thermostat and the quantity of gas dispensed into a known quantity of diluent gas is calculated from the weight difference of the vial before and after diffusion. The procedure is encumbered by problems inherent in the difficulty of determining small weight differences (humidity and dust) and is time consuming. In this way gas mixtures of air or nitrogen with known trace quantities of sulfur dioxide, nitrogen dioxide, and other gases can be obtained which can be further diluted with known quantities of the inert gas to obtain even lower standard concentrations. The teflon vials used have an internal diameter of 4-5 mm and a wall thickness of 0.5-1 mm.

22644

APTIC NO. 41970

Meier zu Koecker, Heinz and Dharendra Chandra Roy

ON THE INFLUENCE OF SULFUR IN THE FURNACE GASES ON GLASS MELTING. PART III. TIME DEPENDENCE OF SO₃ ABSORPTION. (*Zum Einfluss des Ofengasschwefels auf die Glasschmelze. Teil III. Zeitlicher Verlauf der SO₃-Aufnahme*). Text in German. *Glastech. Ber.*, 45 (4):139-145, April 1972. 8 refs.

Practically oriented model tests on the time dependence of sulfur trioxide transport from the furnace gas into the melt of sulfate formation in the surface layers of the melt are described. The model allows graphic estimation of the concentration profile near the melt surface. Noticeable sulfate con-

centrations in depths of a few mm only could be detected. The local limit sulfate concentrations on the surface were dependent on the SO₃ concentration in the furnace gas, the melt temperature, and the glass composition. The SO₃ concentration in the furnace gas was determined by the sulfur content in the fuel oil, the flame temperature, and the residence time as well as other possible factors catalyzing or inhibiting SO₃ formation. The effective local sulfate absorption was dependent on the layer thickness, the exposure time, and the diffusion coefficient which is determined by both the temperature and the composition of the glass melt. The conditions for reaching minimum local sulfate absorption are high gas and melt temperatures exceeding 1600 K, reducing to neutral atmospheres in low temperature ranges, and short residence times in the low temperature range in the case of oxidizing atmosphere.

22645

APTIC NO. 41068

Mkryan, T. G., K. T. Hovannissian, and A. B. Nalbandian

EFFECT OF SMALL ADDITIVES OF BENZENE ON THE COMBUSTION RATE OF HYDROGEN AND CARBON MONOXIDE AT LOW PRESSURES. RATE CONSTANTS OF H+C₆H₆ AND O+C₆H₆ REACTIONS. (*Issledovaniye vliyaniya malykh dobavok benzola na skorost goreniya vodoroda i okisi ugleroda pri nizkikh davleniyakh. Konstanty skorosti reaktsiy H+C₆H₆ i O+C₆H₆*). Text in Russian. *Arm. Khim. Zh. (Erevan)*, 24(4):299-303, 1971. 10 refs.

The effect of benzene on the combustion of hydrogen-oxygen and carbon monoxide-oxygen mixtures was studied in a static vacuum apparatus in a temperature range of 883-963 K. Benzene additives had an inhibiting effect on the combustion rate of hydrogen, which resulted in a lowering of the lower self-combustion limit of hydrogen-oxygen mixtures. The inhibition may be due to two simultaneous reactions resulting in homogeneous chain disruption. Small amounts of benzene (up to 0.5%) intensified the combustion process of CO, thus decreasing the lower limit of self-combustion, while proportions above 0.5% had an inhibiting effect due to the increased importance of reactions causing homogeneous chain disruption. Rate constants for a maximum benzene concentration of 0.125% were determined.

22646

APTIC NO. 41185

Muller, J. L.

THEORETICAL AND PRACTICAL ASPECTS OF THE APPLICATION OF RESONANT COMBUSTION CHAMBERS IN GAS TURBINES. *J. Mech. Eng. Sci.*, 13(3):137-150, June 1971. 12 refs.

Theoretical and experimental work carried out to determine the feasibility of a pressure-gain combustion system for gas turbines is discussed. Fundamental principles involved in the design of resonant combustors are considered and potential improvements in gas turbine performance are calculated by means of a piston-cylinder analogy. Significant improvements in overall thermal efficiency and specific power output can be expected at relatively low pressure ratios, but these improvements become less effective at higher pressure ratios due to the influence of increased compressor delivery temperatures. The results of experimental work on multiple combustor configuration show that the theoretical performance appears to be attainable and that subject to further development work, resonant combustion chambers could be utilized to improve gas turbine performance. (Author abstract)

22647

APTIC NO. 41957

Mullins, W. W.

STOCHASTIC THEORY OF PARTICLE FLOW UNDER GRAVITY. *J. Appl. Phys.*, 43(2):665-678, Feb. 2, 1972. 12 refs.

A discrete theory of cohesionless particle flow under gravity is developed, which assumes particle positions are restricted to

the sites of a (random) lattice. Downward particle flow toward and through an orifice is represented in terms of an equivalent upward-biased random flight of voids (unoccupied lattice sites) originating at the orifice. The void migration rate is assumed limited by the time required for a particle above a void to fall freely through a distance of twice their radius into the void. Because of the strong z (upward) void-jump bias, the theory of random flight yields for the steady-state concentration of voids the equation for two-dimensional diffusion or heat flow equation under the substitution for time. Steady-state problems in gravitational particle flow, termed stochastic flow on our model, may be converted to boundary value problems in ordinary diffusion theory. Solutions representing a point orifice and a finite orifice in the floor of a semi-infinite bed and a point orifice in the bottom of a pipe are given. Particle flux lines and marker motion and exit times are defined and calculated. Time-dependent flow is discussed briefly. Finally, an idealized theory of flow in the immediate vicinity of the orifice is given, which pictures the transition between stochastic flow in the particle bed and bulk free fall in the orifice vicinity as occurring abruptly on a dome shaped interface surmounting the orifice. Calculated values of the total rate of particle flow through the orifice show the observed particle size effects and agree well with measured values in the literature of 5 is less than R/a less than or equal to 25. All main results are given in both two and three dimensions; the former may apply to certain traffic problems. (Author abstract modified) 0

22648

APTIC NO. 41789

Nettleton, M. A.

THERMAL IONIZATION OF SOOT PARTICLES IN GASES HEATED BY REFLECTED SHOCKS TO 2500 TO 4000 K. *J. Phys. D.* 5(1):L4-L6, Jan. 1972. 4 refs.

A calibrated Langmuir-type probe was used to measure ionization in argon and argon-oxygen mixtures shock heated to 2500-4000 K in the presence and absence of soot particles. In the absence of oxygen, ionization is due mainly to impurities scrubbed from the tube walls by the gas flow behind the incident shock, and the soot particles cannot become heavily charged. When oxygen is present the charge density is ten to a hundred times greater. This can be explained by the thermal ionization of fragments produced in the course of oxidation of the original soot particles. However, the process does not result in highly charged particles. (Author abstract modified)

22649

APTIC NO. 41175

Neumann, Bernhard and Herta Rose

THE CATALYTIC OXIDATION OF AMMONIA INTO NITRIC ACID. *Z. Angew. Chem. (Weinheim)*, vol. 1:45-48, 51-55, Feb. 24, 1920. Translated from German. 27p.

A series of experiments on the oxidation of ammonia into nitric oxide were conducted with various contact substances including platinum, iron oxide, iron oxide mixtures, chromium oxide, copper oxide, and vanadium oxide. The results of these tests are discussed and compared with the findings of other researchers. The possible and actual reaction equations are discussed, and the influence of ammonia concentration, flow velocity, and temperature are studied. The best yields were obtained with platinum, giving a 96% conversion at 500 C; iron oxide, 90% conversion at 670 C; and iron-bismuth oxide, 95% conversion at 600 C. Phase diagrams of the gas composition for temperatures from 300 to 700 C are given for these three catalysts. On the basis of the gas composition ascertained, the reaction temperature for several gas mixtures is calculated, and shows that under certain conditions the continuous conversion of ammonia into nitric oxide is possible without an external supply of heat. (Author summary modified)

130

22650

APTIC NO. 41445

Parlagh, Gyula, Gyorgy Racz, and Gyorgy Szekely

INVESTIGATION OF THE OXIDATION MECHANISM OF SULPHUR DIOXIDE ON VANADIUM CATALYSTS. *Chem. Eng.*, 16(1):47-54, 1972. 19 refs.

A mixture of vanadium pentoxide and potassium sulfate or pyrosulfate on a silica gel carrier was used to study the mechanism of sulfur dioxide oxidation. Under normal operating conditions, the active component is in the liquid state. The transition state from solid to liquid is about 440 C depending on the nature of the catalyst, the gas composition, and on whether the transition temperature is reached by increasing or decreasing the temperature. This hysteresis observed and the temperature dependence of the apparent activation energy of the reaction can be simply explained by the fact that at lower temperatures, the active component of the catalyst is in the solid state; and at higher temperatures, it is in the liquid state. The melting temperature depends on the composition of the gaseous phase, and mainly on its sulfur trioxide content. At low temperatures, the reaction proceeds mainly on the surface of the catalyst, while at higher temperatures, in the interior of the liquid phase. The increase of the apparent activation energy at higher temperatures is due to the slowness of diffusion. The deeper layers of the liquid phase are not readily available for reaction. (Author summary modified)

22651

APTIC NO. 41958

Paul, R. C., C. I. Arora, and K. C. Malhotra

COMPLEXES OF SULPHUR TRIOXIDE WITH OXIDES OF NITROGEN. *Indian J. Chem.*, vol. 10:94-96, Jan. 1972. 16 refs.

Nitrogen pentoxide, tetroxide, and trioxide form white crystalline, hygroscopic adducts in liquid sulfur dioxide with sulfur trioxide having the compositions $N_2O_5(3SO_3)$, $N_2O_5(4SO_3)$, $N_2O_4(2SO_3)$, $N_2O_4(3SO_3)$, $N_2O_4(4SO_3)$, $N_2O_3(2SO_3)$, and $N_2O_3(3SO_3)$. The adducts are soluble in common organic solvents and behave as 1:1 electrolytes in nitromethane and acetonitrile. The infrared studies of $N_2O_5(3SO_3)$ and $N_2O_5(4SO_3)$ show them to be ionic having structures $2NO_2^+S_2O_{10}^{2-}(2)$ and $2NO_2^+S_4O_{13}^{2-}(2)$ respectively. This has been further confirmed by their behavior in fluorosulfuric and disulfuric acids. Since in these acids the formation of nitronium ion is indicated, it may be concluded that SO_3 combines with nitric anhydride to form nitronium salts of tri and tetra-sulfuric acids. Similarly the formation of nitronium (NO_2^+) and nitrosonium (NO^+) ions is indicated for the adducts of N_2O_4 with SO_3 . The formation of nitrosonium disulfate and nitrosonium trisulfate is indicated for the adducts of nitrous anhydride. (Author abstract modified)

22652

APTIC NO. 41555

Pravilov, A. M., L. G. Karpov, and F. I. Vilesov

PHOTOCHEMICAL PROCESSES TAKING PLACE DURING THE PHOTOLYSIS OF MOLECULAR OXYGEN AND MIXTURES OF OXYGEN WITH HELIUM, ARGON, XENON, NITROGEN, AND CARBON DIOXIDE.

(Fotokhimicheskiye protsessy proiskayushchiye pri fotolize O_2 i smessey O_2 i M gde M ravnyayetsya He, Ar, Xe, N_2 , CO_2). Text in Russian. *Khim. Vysokikh Energii*, 5(5):388-392, 1971. 28 refs.

Based on literature data and recent experimental results obtained on oxygen, and oxygen and M photolysis (M meaning Helium, Argon, Xenon, Nitrogen, or Carbon dioxide), an analysis of the processes determining the quantum yield in ozone formation is presented. None of the M elements produces ultraviolet radiation absorption in the oxygen absorption range or reaction with $O(3P)$ and $O(1D)$ atoms in the Schuman-Runge continuum region. A reaction mechanism allowing the computation of the absolute quantum yields in ozone formation under low ozone concentration conditions and the determination of the O_3 concentration under photochemical equilibrium condi-

tions of the O₂, O₃, and M mixture is proposed. Tests performed with pure O₂, and a series of O₂ + M mixtures reveal satisfactory agreement between experimental and theoretical data for low O₃ concentrations.

22653

APTIC NO. 41617

Radcliffe, Samuel W. and John P. Appleton

SOOT OXIDATION RATES IN GAS TURBINE ENGINES. *Massachusetts Inst. of Tech., Cambridge, Fluid Mechanics Lab., National Aeronautics and Space Administration Grant NGL 22-009-378, NASA-CR-125404, MIT-Fluid Mechanics Lab. Publ.-71-12, 17p., June 1971. 16 refs. NTIS: N72-15712*

A basis for extrapolating soot oxidation rate measurements obtained in laboratory flames to the more extreme operating conditions of gas turbine combustion chambers is proposed. The proposal is based on the observation that, within probable experimental uncertainty, the limited soot oxidation measurements correlate with the more extensive measurements of the surface oxidation rates of macroscopic sized samples of pyrographite. The soot oxidation rates thus determined for the conditions of a typical gas turbine combustion chamber are considerably lower than previous estimates which were based on simple extrapolations of the flame data. (Author abstract)

22654

APTIC NO. 41730

Ramaswamy, K. and G. Shanmugam

MOLECULAR CONSTANTS OF SOME NITROGEN-OXYGEN COMPOUNDS; GREEN'S FUNCTION ANALYSIS. *Acta Phys. Pol., 41A(1):3-9, 1972. 16 refs.*

Green's function analysis of substituted and perturbed molecules proposed by DeWames and Wolfram was applied to the vibrational study of some nitrogen-oxygen compounds. The potential energy constants, mean amplitudes of vibration, Coriolis coupling constants, and the rotational distortion constants were evaluated and found to be in very good agreement with the experimental values. (Author abstract modified)

22655

APTIC NO. 42277

Roy, Dipak and Dimitri Gidaspo

A CROSS FLOW REGENERATOR--A GREEN'S MATRIX REPRESENTATION. *Chem. Eng. Sci., vol. 27:779-793, 1972. 24 refs.*

A mathematical model describing the operation of a two fluid, cross flow regenerator is proposed. The solution is also applicable to a steady operation of a cross flow rotary regenerator and to mass exchangers, in which a species, such as an air pollutant, is transferred from the exhaust stream to a process stream. The proposed mathematical model gives rise to a hyperbolic system of three linear, first order partial differential equations for which a Green's matrix is constructed. An integral representation of the solution in terms of Green's matrix enables one to solve the problem with arbitrary initial inlet conditions and heat generation terms. As an example, the problem of cross-cooling of a gas-solid reaction with time dependent heat generation is considered. (Author abstract modified)

22656

APTIC NO. 42288

Ryan, K. R.

IONIC COLLISION PROCESSES IN GASEOUS N₂O. *J. Chem. Phys., 57(1):271-276, July 1, 1972. 14 refs.*

Ionic collision processes were studied in nitrous oxide by mass spectrometric techniques with particular emphasis on the state of excitation of the positively charged N₂O ion. Evidence is presented for the contention that electrons of energies greater than or equal to 17 eV on collision with N₂O molecules produce long-lived excited positively charged N₂O ions which are capable of reacting to produce positively charged nitric oxide plus atomic nitrogen plus N₂O, or positively charged

atomic oxygen plus molecular nitrogen plus N₂O, without significant conversion of translational to internal energy. For electrons with energy greater than or equal to 17 eV at least 1% of the positively charged N₂O ions appear to have an internal energy greater than or equal to 2.4 eV. Excited positively charged N₂O ions are involved in the unimolecular predissociation of N₂O to yield NO plus N. However, the abundance of these ions which survive for times appropriate to the collision experiments described here is only about 0.01%. In the collision of positively charged argon or positively charged molecular nitrogen with N₂O simple charge transfer predominates over dissociative reactions, even though sufficient energy is available for dissociation to occur. (Author abstract modified)

22657

APTIC NO. 42292

Sackett, Philip B. and James T. Yardley

DYNAMICS OF NO₂ ELECTRONIC STATES EXCITED BY A TUNABLE DYE LASER. *J. Chem. Phys., 57(1):152-167, July 1, 1972. 48 refs.*

A tunable organic dye laser was used as a narrow band radiation source to excite nitrogen dioxide molecules under essentially collision-free conditions in the spectral range 4315-4605 Å. The fluorescence which is observed in a very large cell is nonexponential, so that the decay function for each experiment is characterized as both nonexponential and exponential, the latter for purposes of comparison with other experiments and for purposes of discussion in standard terms. The lifetimes which are obtained show a marked structural pattern when displayed as a spectrum with individual values ranging from 62-75 microsec. for observation of fluorescence at wavelengths longer than 5200 Å. The dependence of lifetime and nonexponentiality, as well as their spectral variations, on observation wavelength, pressure, and fluorescence observation geometry are investigated over a shorter spectral region. A small amount of high resolution spectral data is reported which seems to indicate the presence of some unresolved, quasicontinuous absorption underlying the obvious bands of the visible spectrum. The effects of restrictive fluorescence measurement geometry on lifetime measurements are explored, with particular attention to other investigations, in which the shorter, nonvarying lifetime observations may be explained. A hypothesis is presented to explain the observed dynamics and spectroscopy of NO₂.

22658

APTIC NO. 41787

Shigeta, Tameyoshi and Tadato Yamamoto

SENSITIVITY OF GASOLINE. *Gasoline no sensitivity ni (suite). Text in Japanese. Preprint. Ministry of International Trade and Industry (Japan). Public Nuisance Resources Research Inst. p. 24-40, June 1972. (Presented at the Public Nuisance Resources Research Seminar, Tokyo, Japan, 1971)*

Japanese regulations require no-lead gasoline by 1974. The octane number must be 88 for regular gasoline and 95 for premium. No-lead gasoline causes problems such as valve recession, increased photochemical reactions, increased knocking, and increased olefin and aromatic hydrocarbons. The sensitivity of gasoline was measured as a function of iso-oct, i.e., n heptane, and tetraethyl lead. As lead increases, sensitivity decreases. Sensitivity was measured as a function of n heptane and toluene. As the n-heptane increases, the sensitivity increases. The sensitivity as measured as a function of the increase of lead; as lead increases the sensitivity decreases. The sensitivity of gasolines for 1969-1971 were measured and found to be increasing.

22659

APTIC NO. 42044

Simpkins, P. G.

PROPER RESPONSE TO ACCELERATIONS INDUCED BY WEAK SHOCK WAVES. *Imperial Coll. of Science and Technology, London (England). Proc. Intern. Shock*

Tube Symp., 8th, London, England, 1971, p. 64/1-64/11. 10 refs. (July 5-8.)

The transient response of water drops to accelerations induced by weak shock waves was examined. Tests in regions of increasing Weber number established that the drop response changes from a vibrational mode via a bag-type phenomenon into a quasi-stable state. The upper bound of the vibrational mode was We approximately equals 4000. Three different bag-type phenomena were observed in the range 5000-25,000. The first visible evidence of high frequency surface waves was found at We equals 400,000, a value which is substantially greater than the instability threshold. The quasi-stable region persisted as far as We equals 1,000,000, which confirms recent numerical predictions that this region is very broad. (Author abstract modified)

22660

APTIC NO. 41797

Slanger, Tom G., Bernard J. Wood, and Graham Black

KINETICS OF O(3P) PLUS CO PLUS M RECOMBINATION. *J. Chem. Phys.*, 57(1):233-238, July 1, 1972. 13 refs.

Rate coefficients were measured at 250-370 K for the three-body recombination of oxygen O(3P) with carbon monoxide. Impurities in the CO, which had influenced earlier results at 300 K, were removed by more elaborate purification methods. For CO as the third body, the rate constant is given by k equals 6.3 times 10 to the minus 33rd power exp (minus 4340 plus or minus 550/RT) cm to the 6th molecule to the negative second/sec. For nitrogen gas and carbon dioxide, the 296 K rate constants are 2.3 and 6.2 times 10 to the minus 36th power cm to the sixth molecule to the negative second/sec, respectively. (Author abstract modified)

22661

APTIC NO. 41367

Stopperka, K. and F. Kilz

COMPOSITION OF THE GAS PHASE OVER THE LIQUID SYSTEM H₂O-H₂SO₄ AS A FUNCTION OF TEMPERATURE. (*Die Zusammensetzung der Gasphase ueber dem fluessigen System H₂O-H₂SO₄ in Abhaengigkeit von der Temperatur*). *Z. Anorg. Allgem. Chem.*, vol. 370:49-55, 1969. 8 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 10p., Dec. 1971.

A study of the composition of the gas phase over the liquid system water-sulfuric acid as a function of temperature is presented. Using silicon windows, the infrared spectra of the gas phase over 78 to 100% sulfuric acid were recorded from 30 to 250 C. In order to be able to positively prove all of the qualitative and quantitative changes over the H₂O-H₂SO₄ system, the steps of concentration passed through during the investigation of the entire system were small. Since in the presence of sulfur dioxide, due to characteristic individual absorption, the contours of the absorption bands of sulfuric acid and sulfur trioxide are disturbed and falsified, the sulfuric acid was thoroughly purged of SO₂ prior to taking measurements. The resulting data indicated bands at 550/cm which were correlated with SO₂ deformation vibration of H₂SO₄. Also observed was an absorption band in the infrared spectra of the gaseous phase over oleum solutions at 548/cm which was coordinated with SO₃. An SO₂ rocking vibration at 570/cm appeared as a distinct shoulder on the absorption flank. At a temperature of 100 C, it was possible for the first time to detect molecular H₂SO₄ in the gaseous phase. The composition of the gaseous phase was conclusively determined by the molecules appearing in the liquid phase given for measuring. While a maximum sulfuric acid partial pressure occurred at all temperatures over a 100% H₂SO₄, the concentration of gaseous H₂SO₄ diminished considerably at the transition to the oleum range. For the in part considerable quantities of sulfur trioxide in the gaseous phase, the thermal decomposition of the sulfuric acid was primarily responsible. Evaluation of the spectra yielding information on the equilibrium over the system, is presented in the form of tabular and graphical data.

22662

APTIC NO. 41099

Tamura, Teijiro

THE REACTIONS BETWEEN A RHENIUM FILAMENT AND NITRIC OXIDE AT HIGH TEMPERATURES AND LOW PRESSURES. *Bull. Chem. Soc. Japan* (Tokyo), 45(4):1034-1038, April 1972. 15 refs.

The rates of the reaction of rhenium with nitric oxide under a filament temperature of 1300-1800 K and nitric oxide pressures of 0.0003-0.001 torr were measured by a static method. The rate of the reaction increased with an increase in the temperature, and the apparent activation energy was 24 kcal/mol. The rate of the reaction was proportional to the nitric oxide pressure and independent of the nitrogen pressure. The apparent compositions of the rhenium oxide produced in the reaction were determined from the weight change in the rhenium filament and from the amount of nitric oxide consumed in the temperature range of 1300-2100 K. Rhenium trioxide and rhenium heptoxide were formed at lower temperatures and at higher temperatures respectively. The Re₂O₇ was presumed to be formed by the oxidation of the ReO₃ deposited on the vessel wall with atomic oxygen evolved in a high-temperature range. (Author abstract modified)

22663

APTIC NO. 41031

Tan, C. W. and C. J. Hsu

MASS TRANSFER OF AEROSOLS WITH AXIAL DIFFUSION IN NARROW RECTANGULAR CHANNELS. *Appl. Sci. Res.*, 25(5):295-312, Feb. 1972. 18 refs.

The problem of mass transfer of aerosols with axial, as well as radial, diffusion in laminar flow in a narrow rectangular channel is studied. Two cases are investigated. The first case is where all particles enter the channel inlet and none form within the channel; and the second, where no particles enter the channel, and formation in flight occurs within the channel. For each case, analyses are made for both slug and Poiseuille flows. The first twenty modes of the eigenvalues, the eigenfunctions, and the coefficients of series expansion are obtained for several diffusion Peclet numbers, Pe . The first 12 of them are presented for Pe equals 1, 5, 10, 100, and infinity. Asymptotic expressions for the eigenvalues and the eigenfunctions are also given. The effects of axial diffusion on the local particle concentration, the bulk concentration, the Sherwood number, and the fraction of aerosols arriving at any cross-section of the channel are studied for various diffusion Peclet numbers. For diffusion with or without formation in flight, the effect of axial diffusion may be neglected at an axial distance from the channel inlet greater than one and a half times that of the channel height for Pe between 1 and 100. (Author abstract modified)

22664

APTIC NO. 41906

Tellinghuisen, J. B., C. A. Winkler, and L. F. Phillips

QUANTUM YIELDS IN THE 58.4-NM PHOTOLYSES OF AMMONIA AND WATER. *J. Phys. Chem.*, 76(3):298-301, Feb. 3, 1972. 21 refs.

Quantum yields for the ionizing photolysis of ammonia and water were determined by mass spectrometric analysis and by measurements of the absorption of 58.4-nm radiation by the photolysis products. At pressures where ion-electron recombination is predominantly homogeneous the quantum yields of molecular hydrogen were 0.93 plus or minus 0.15 from ammonia and 2.1 plus or minus 0.5 from water. Yields from water were sensitive to wall effects. Results are discussed in terms of known photofragmentation patterns and ion-molecule reactions, together with less well known dissociative recombination processes and neutral radical reactions. The relative effects of 58.4-nm ionizing photolysis and gamma radiolysis are compared for water, ammonia, and carbon dioxide. (Author abstract modified)

22665

APTIC NO. 41173

Tsukamoto, H., S. Makisumi, H. Hirose, T. Kojima, H. Fukumoto, K. Fukumoto, M. Kuratsune, M. Nishizumi, M. Shibata, J. Nagai, Y. Yae, K. Sawada, M. Furukawa, H. Yoshimura, K. Tatsumi, K. Oguri, H. Shimeno, K. Ueno, H. Kobayashi, T. Yano, A. Ito, T. Okada, K. Inagami, T. Koga, Y. Tomita, T. Koga, Y. Yamada, M. Miyaguchi, M. Sugano, K. Hori, K. Takeshita, K. Manako, Y. Nakamura, and N. Shigemori

THE CHEMICAL STUDIES ON DETECTION OF TOXIC COMPOUNDS IN THE RICE BRAN OILS USED BY THE PATIENTS OF YUSHO. *Fukuoka Igaki Zasshi* (Fukuoka Acta Med.), vol. 60:496-512, 1969. 14 refs. Translated from Japanese. 39p.

The particular brand of rice bran oil thought to be a possible cause of Yusho (chlorobiphenyl poisoning) was studied by several chemical means to determine if it contained any toxic compounds. The possibility that Yusho might be arsenic or pentachlorophenol (PCP) intoxication were ruled out because the arsenic and PCP contents in the oils used by the patients were negligible. Gas chromatographic analysis showed that the oils contained a large amount of a mixture of chlorobiphenyls which was used in a purification process of the rice bran oils as a heat transfer agent. Chemical and activation analysis indicated organic chlorine content in the oils of 1000 to 1500 ppm. Gas chromatography peaks, which agree with chlorobiphenyl components, were found in the fatty tissues of patients. Gas chromatographic analysis of extractions from patient placentas and fetuses also showed the presence of chlorobiphenyl components; it is assumed that these components transfer from mother to fetus. These findings were also supported by animal experiments. (Author abstract modified)

22666

APTIC NO. 41179

Tuan, Pham-Dinh

PROBLEM OF MULTIPLE LINEAR HYPOTHESES TEST IN ANALYSIS OF THE VARIANCE. *Rev. Statist. Appl.*, 19(1): 1971. 3 refs. Translated from French. McGraw-Hill and Werner Inc., Washington, D. C., Mundus Systems, 10p.

A purely mathematical treatment of the problem of a multiple linear hypotheses test in analysis of the variance is presented. The case of a factorial plane with two factors is considered. Equations are given for the test of multiple hypotheses and power function. Several tables are included showing the decentering parameter at a point where the test determines the hypothesis. Power functions are also shown in tabular form.

22667

APTIC NO. 41100

Ueno, Yasuo and Isamu Sano

STUDIES OF SALT SOLUTION AEROSOLS. VIII. THE EFFECT OF HUMIDITY ON THE STABILITY OF SPRAY-DRIED Na_2SO_4 AEROSOL AND AN ESTIMATE OF THE PARTICLE DENSITY. *Bull. Chem. Soc. Japan* (Tokyo), 45(4):975-980, April 1972. 13 refs.

The dehydration of aqueous sodium sulfate, the effect of water vapor on the coagulation rate of the dried aerosols, and the density of the dried particle were investigated. The aerosols obtained by spraying an aqueous Na_2SO_4 solution of concentrations ranging from 0.1 to 10% by weight were dried by a furnace at 200-300°C and were then subjected to stirred aging at room temperature in an atmosphere of 90% relative humidity of less; the variations in both mass concentration and particle size were then measured with the lapse of time. By employing the results thus obtained and by making some assumptions, the density of the particle in dried aerosols was calculated to be several tenths of one gram per cc, which is smaller by a factor of 3 to 4.5 than the bulk density of solid Na_2SO_4 . The amount of water which the dried particle might hold if kept in a humidified atmosphere was estimated, deter-

mining that the density of a particle would decrease with increase in its water content, e.g., the density of the particle with composition of sodium sulfate decahydrate would be 0.32 g/cc, smaller by a factor of 4 to 5 than the bulk density. The influence of water vapor on the stability of the dried aerosols was studied; the rate of coagulation increased with humidity increase. (Author abstract modified)

22668

APTIC NO. 41963

Vasconcelos, M. H. de, F. Cannemeyer, and A. E. de Vries

THE CHOICE OF A CALIBRATION GAS FOR CH₄ SPECTROPHONE MEASUREMENTS. *NH₃ OR A SMALL AMOUNT OF C₂H₆ IN CH₄*. *Chem. Phys. Letters* (Amsterdam), 12(1):154-156, Dec. 1, 1971. 4 refs.

When measuring relaxation times applying the spectrophone, one needs a calibration gas, either to correct for the frequency response of the gas cell in the amplitude-frequency method, or to distinguish the phase-shift due to the relaxation from the other phase lags in the phase method. It is the object of this letter to show that the choice of ammonia as a calibration gas for methane measurements leads to erroneous results, and that it is preferable to use a small amount of hexane in methane. (Author abstract)

22669

APTIC NO. 41716

Webster, Henry, III and Edward J. Bair

OZONE ULTRAVIOLET PHOTOLYSIS. IV. O₂ PLUS O(3P) VIBRATIONAL ENERGY TRANSFER. *J. Chem. Phys.*, 56(12):6104-6108, June 15, 1972. 13 refs.

The rate of relaxation of vibrationally excited oxygen in high vibrational levels of the $\text{O}(^3\Sigma_g^-)$ state was measured following flash photolysis of ozone-argon mixtures. The relaxation rate is proportional to the $\text{O}(^3\text{P})$ concentration when the concentration ratio of $\text{O}(^3\text{P})$ to O_3 is not small. The large increase in relaxation rate with energy level is best explained by multiple quantum transitions.

22670

APTIC NO. 41663

Witte, A. B. and B. J. Matthews

LASER HOLOGRAPHY STUDY OF OIL-FIRED BURNER COMBUSTION. *TRW Systems Group, Redondo Beach, Calif., Environmental Protection Agency Contract CPA-70-4, TRW Rept. 14103-6004-RO-00, APTD-1088, 61p., Nov. 1971. 12 refs.*

NTIS: PB 209479

The feasibility of recording fog-free holographic interferograms of residential fuel fired oil burner flames was demonstrated with two holocameras designed to observe the near and far field of the burner. The most important feature observed interferometrically was that the flame structure is extremely turbulent. This turbulence made it impossible to resolve the fringe pattern on the centerline of the burner. Preliminary data reduction of the interferograms showed that on the outside edge of the burner, the temperature gradient was about 800 F/inch. Barewire thermocouple measurements made of the flame were corrected for radiation, and are believed to be lower than the true flame temperature because of fuel droplet impingement and evaporation. Excellent quality holographic interferograms were recorded of a small burner (Bernzomatic burner). Fringes could be resolved, read and interpreted. Temperature gradients calculated at the edge of this laminar flame were about a factor of 10 higher than for the Beckett fuel oil burner turbulent flame supplied by EPA. Recording a holographic interferogram of a hot air gun showed the feasibility of controlling the turbulence level of a flame-like hot gas. Preliminary data were also reduced in this case. (Author summary)

22671

APLIC NO. 41029

Yates, John T., Jr. and David A. King

CHEMISORPTION OF CARBON MONOXIDE ON TUNGSTEN: CORRELATION OF REFLECTION-ABSORPTION INFRARED SPECTRA WITH CO BINDING STATE POPULATION. *Surface Sci.*, 30(3):601-616, May 1972. 42 refs.

The vibrational frequency of carbon monoxide chemisorbed on an atomically clean polycrystalline tungsten ribbon was studied using reflectance-infrared spectroscopy and ultrahigh vacuum techniques. The initial appearance of an infrared absorption band at 2093/cm is unequivocally associated with the onset of adsorption of the weakly-bound alpha-CO state, which occurs at coverages where the more strongly-bound beta-CO species are already extensively populated. As the alpha-CO coverage is increased to its maximum value, the infrared band shifts to 2117/cm. Partial thermal desorption of the alpha-CO by pumping at 295 K for 2000 sec causes the band to reversibly shift back to 2093/cm. The band disappears rapidly and completely upon thermal desorption of CO at 403 K, confirming that the adsorption band observed in this region of the spectrum is due to alpha-CO. The spectral frequency indicates that the alpha-CO species on tungsten are closely analogous to the linear CO moieties found in transition metal carbonyls. The vibrational frequency observed is in close agreement with low energy electron energy-loss measurements made for CO on W(100). A model is proposed for the slight strengthening of the carbon-oxygen bond in alpha-CO as the CO coverage increases. The model involves coverage-dependent electronic back-donation from surface π atoms into π -antibonding orbitals as originally proposed by Blayholder for adsorbed CO, and by Jones for certain transition metal hexacarbonyls. (Author abstract)

EFFECTS-HUMAN HEALTH

22672

APLIC NO. 41139

AIR POLLUTION STUDY IS INDUSTRY'S LARGEST HEALTH-RELATED RESEARCH PROJECT. *Edison Elec. Inst. Bull.*, 40(2):78-79, March-April 1972.

In June 1966, Edison Electrical Institute's Board of Directors authorized Institute support of the Electric Research Council National Coal Association Air Pollution Research Program. The program, which is being carried out under the operation of the Electric Research Council, is the largest health related research project ever undertaken by the electric utility industry. One phase of the program has as its objective the determination of the physiological effects of long-term continuous exposure of guinea pigs and cynomolgus monkeys to sulfur dioxide, sulfuric acid mist, fly ash, and their mixtures. Recently completed tests tried combinations of fly ash and sulfur dioxide to determine if any synergistic action could be determined. Threshold Limit Values are indicated.

22673

APLIC NO. 41513

Japan Environmental Agency, Tokyo, Planning and Coordination Bureau

AN INTERMEDIARY REPORT OF THE INVESTIGATION ON INFLUENCE OF SMOKE AND OTHERS. 1970. (*Showa 45-nendo bakennado eikyo chosa chukan hokokusho*). Text in Japanese. 43p., 1970.

The aim of this intermediary report is mainly to discuss the relationship between the state of environmental pollution and its influence on the human body. Respiratory symptoms, pollution, and smoking are correlated. Ichihara, Higashiosaka, and Omata cities were regarded as polluted areas, while Sakura, Tondabayashi, and Fukuoka cities were the controls. The 3003 subjects were selected from the inhabitants who were not affected by their professions for several years in these areas. They consisted of females above the age of 30 years and

males above the age of 69 years. As a whole, there was no influence of smoking on the rate of respiratory symptoms. The rate of respiratory symptoms in all the standardized subjects was observed in this investigation, in order to see the difference of the rate of respiratory symptoms caused by the influence of the area only, without any influence of smoking. The difference of the rate of continuous cough and sputum had a tendency to become obvious between the polluted and in nonpolluted areas, generally in the areas with high concentrations of pollution. Sex, age, the rate of the respiratory symptoms classified by the areas, differences of the rate of main respiratory symptoms which have been classified by the areas, and the relation between the rate of respiratory symptoms and smoking are indicated.

22674

APLIC NO. 41626

SULFUR TRIOXIDE. (SULFURIC ANHYDRIDE) SO₂.

Am. Ind. Hyg. Assoc. J., 33(1):53-55, Jan. 1972. 12 refs.

The recommended 8 hr maximum concentration for sulfur trioxide exposure is 1 mg/cu m or 0.3 ppm by volume in air. Short exposure to 5 mg/cu m is tolerable for 5 min without permanent damage. Exposure to the fumes from fuming sulfuric acid for 8 min results in severe injury to the respiratory tract, characterized by disabling fibrosis of the lungs, bronchiectasis, and emphysema. Death resulted from bacterial infection more than one and one-half years after exposure. In animal studies, brief peak of 75 ppm did not result in permanent damage, however continuous exposure 200 mg/cu m killed guinea pigs within one hour. This was the most sensitive species. Inhalation causes irritation of the upper respiratory tract; skin contact causes corrosion, ulceration, and chemical burns; eye contact causes redness and swelling, the cornea becomes opaque, and if sufficient acid is present, the cornea may be perforated and the sight of the eye, as well as the organ itself, may be lost. Sulfur trioxide is formed from the combustion of sulfur, burning of sulfur containing gases, or wherever sulfuric acid is heated in open containers. Hazards may be controlled with proper protective clothing to shield the skin. A full face plate and self-contained breathing apparatus is required for working in concentrations above 20,000 ppm. Air sampling in the field is accomplished with a midget impinger or fritter absorber, and analysis is accomplished with a standard base and indicator. Continuous measurements are made with electro-conductivity instruments. Known asthmatics, bronchitics, or persons with emphysema or gastritis should never be exposed to SO₃. 0

22675

APLIC NO. 41750

Tokyo Metropolitan Government (Japan), Research Inst. of Hygiene

PROGRESS REPORT OF POLLUTION RESEARCH. NO. 1: BASIC MEDICAL AND EXPERIMENTAL RESEARCHES ON PHOTOCHEMICAL SMOG. (*Kogai kenkyu chukan hokoku no. 1: kokagaku sunoggu ni kansuru kiso igakuteki jikentei kenkyu*). Text in Japanese. 62p., 1972.

Experiments were conducted to study the effects of oxidants on eyes, cultured white corpuscle chromosomes, respiratory physiology, and plants. A smog chamber was used as the oxidant generator. Nine healthy college male students were exposed to flue gas, ozone, and other gases at concentrations higher than that in actual photochemical smog for two minutes, 100 times. At ozone concentrations up to one ppm, no irritation on eyes was observed. Among other gases, only acrolein was found irritating. Exposure of guinea pigs to 0.5 ppm and 1.7 ppm ozone for 120 minutes revealed that ozone not only injured the upper respiratory tract but also injured lung alveoli of the lower respiratory tract. Rabbits exposed to ozone at one ppm for three hours showed decreases in lung expansion ability. Same effects were found for rats exposed for three to five hours. Detection of peroxyacetyl nitrate (PNA) by gas chromatography-mass spectroscopy is also discussed.

22676

Fukui City Medical Assoc. (Japan)

EPIDEMIOLOGICAL SURVEY OF AIR POLLUTION.
(*Tsukiosen ekigaku chosa*). Text in Japanese. 33p., 1971.

The effects of air pollution on health are discussed including chronic bronchitis caused by sulfur dioxide. A questionnaire was distributed and a medical examination was carried out. On the basis of the data collected by the Pollution Control Section of Fukui City, areas of comparatively high concentration, medium concentration, and low concentration were selected by computer. Males and females over the age of 40 years living in these areas were selected. The average return rate of the questionnaire was 92.1%. Of the 3347 persons who filled out the questionnaire, the relation of age and smoking habits in the affected people was investigated. Incidentally, Fukui city falls into the category of first degree pollution (over 0.5-below 1.0 mg) according to the criterion for air pollution by the lead dioxide method. The prevalence of chronic bronchitis had a tendency to increase in proportion to the age and smoking amount. The corrected prevalence by the area of chronic bronchitis was area 7.2%, 6.6%, 5.7%, and 3.7% in the high, high, medium, and low pollution areas, respectively. The rate of obstructive chronic bronchitis impairment among the persons examined was high in proportion to the increase of age and smoking amount. 0

22677

APTIC NO. 42091

ANALYSIS OF THE SITUATION REGARDING THE
LEAD CONTAMINATION OF THE BIOSPHERE AND
BIOMEDICAL ASPECTS. *Protectio Vitae*, 1972:89-90,
1972.

In spite of extensive research, the chemical industry has not found an adequate substitute for lead additives in motor fuel. Motor engines will have to be structurally modified. The lead concentrations in gasoline vary from lower values of 0.2 g/l to 1.1 g/l. The rate of increase of lead emissions averages 3.5%/yr but in some areas has reached 5-15% and more. Lead concentrations at ground level near main roads and in cities varies from 10 micrograms cu m to 40 micrograms cu m. The quality of the air cannot be guaranteed above 2 micrograms/cu m. Traces of lead compounds cause grave disturbances of metabolism. Even the smallest quantities of lead inhibit the activity of the delta-aminolevulinic acid dehydratase in erythrocytes. There are possible further effects of lead on mitochondria, cell division, gonads, biological oxidation, and the breathing chain. Tetraethyl lead has a remarkably high specific toxicity. It is easily soluble in fat, enriches itself in the central nervous system, and can permeate through unbroken skin. Claimed advantages of small reductions in lead emissions are quickly annulled by increased traffic.

22678

APTIC NO. 41438

Babanov, G. P. and Yu. A. Burov

ADAPTATION DURING THE ACTION OF LOW CON-
CENTRATION TOXIC FACTORS ON THE BODY IN
INDUSTRIAL ENVIRONMENTS. (*Voprosy adaptatsii
k nizkoye na organizm toksicheskikh faktorov maloy in-
dustrialnosti proizvodstvennoy sredy*). Text in Russian. Gi-
giena i Sanit., 37 (1973):96, 1972. 2 refs.

Rats were exposed to 50 mg toluene cu m for 5 hr daily for 1-6 mo. The serum protein levels increased during the first four months, and then gradually decreased to normal levels. Serum ascorbic acid and heme riboflavin initially decreased, but after four months returned to normal levels. Toluene increased immunobiological reactivity and oxygen uptake by the rats.

22679

APTIC NO. 41199

Bayer, O.

ARTICLE ON THE TOXICOLOGY, CLINIC AND
PATHOLOGICAL ANATOMY OF NICKEL
TETRACARBONYL POISONING (*Beitrag zur Tox-
ikologie, Klinik und pathologischen Anatomie der Nickel-*

karbonylvergiftung). Arch. Gewerbepathol. Gewerbehyg.,
vol. 9:592-606, 1939. 12 refs. Translated from German.
21p.

The results of clinical observations and two autopsies indicate that nickel carbonyl acts as an inhalation poison on the entire surface of the respiratory epithelium and leads to a picture of toxic pneumonia with all parts of the lung equally affected. It is difficult to judge to what extent the frequently observed cerebral hemorrhages can be traced back to resorbed nickel carbonyl or to what extent they must be regarded as asphyxiation hemorrhages. Consequently, in the clinical picture, dyspnea, irritative cough, and pains along the costal arch are foremost. In pathological-anatomical terms, the condition is characterized by a peculiar coagulation process in both lungs which is distinguished histologically by the lung alveoli being occupied by a fibrin deposit with an almost complete lack of cellular blood elements. In the treatment of nickel carbonyl poisoning, success was obtained with the intravenous administration of large quantities of a high percent glucose solution as well as medications of calcium, strophanthidin, and camphor circulatory agents. (Author summary modified)

22680

APTIC NO. 41097

Brondine, Virginia

POINT OF DAMAGE. *Environment*, 14(4):2-15, May 1972
36 refs.

Health effects are represented in air quality standards only to the extent that a specific concentration of a single pollutant can be demonstrated to cause a harmful effect on health. A margin of safety is then added. These standards are not useless, but they are simplistic. Epidemiologic evidence has indicated the complexity of the interaction of pollutants and the variety of the human condition. Nitrogen dioxide lowers the resistance to bacterial and viral infection. Ozone, lead oxides, and particulates impair the ability of phagocytes to trap streptococci. Silicosis is caused by the inhalation of dust containing a high proportion of silica. Lung cancer has been induced in animals by the inhalation of benzopyrene, a hydrocarbon, and sulfur dioxide. When animals have been infected with influenza and exposed to ozonized gasoline, a synthetic smog, lung cancer has also been produced. Mutations have been produced by both SO₂ and radionuclides. Low levels of toxic agents may result in a great variety of delayed pathological manifestations. Some populations suffer inherent risks due to special deficiencies, preexisting disease, or special exposure. The incidence of asthma has increased in urban areas. People who suffer from anemia are likely to be sensitive to CO and lead. Occupational exposure is reinforced by cigarette smoking, and the combined effect is greater than the sum of the two effects.

22681

APTIC NO. 41024

Brouet, G., J. Bigon, G. Bonnard, and J. Gorn

EFFECT ON PUBLIC HEALTH OF AIR POLLUTION
WITH ASBESTOS AND OTHER FIBROUS DUST PAR-
TICLES. (*Incidence sur la sante de la pollution at-
mospherique par l'asbeste ou autres particules fibreuses*).
Text in French. Rev. Tuberc. Pneumol. (Paris), 35(5):461-
478, 1971. 127 refs.

Air pollution caused by microscopic asbestos particles has become a serious problem in large industrial areas, and may increase in the future due to the increase in world asbestos production. The clinical signs of asbestosis as an occupational disease are reviewed. Pulmonary fibrosis due to asbestos is becoming rare, or at least less apparent, due to precautions in the asbestos industry. However, the symptoms of asbestosis are becoming increasingly frequent. The role of asbestosis in the rising frequency of broncho-pulmonary cancer and pleural and peritoneal mesothelioma is discussed in the light of epidemiologic and experimental studies. It seems that asbestos may produce cancer by facilitating the action of chemical or mineral carcinogens, such as those contained in cigarette

smoke. Pleural plaques, calcification, and asbestos pleurisy are becoming more frequent. The relationship between these benign pleural lesions and the later onset of malignant mesothelioma is discussed. Increasing air pollution with asbestos may be a threat to the health of city dwellers, apart from occupational exposure. The prevention and control of atmospheric pollution with asbestos particles is recommended.

22682

APTIC NO. 42035

Callahan, Joseph M.

CO STANDARD COULD CAUSE MAJOR ECONOMIC UPHEAVAL. *Automotive Ind.*, 145 (10):35-39, Nov. 15, 1971.

The environmental Protection Agency has adopted a standard for 1975 which seeks to limit the concentration of carbon monoxide in the air to not more than an average of 9 ppm during an eight hour period, and not above 35 ppm in any one hour. Many air pollution authorities, however, consider that this severe standard is ill-advised, because the CO levels in question are far below those which can cause any real health problem, while, to meet the standards may require the banning of cars from many cities, with consequent disruption of the economy and even ordinary living in these cities. The aim is to ensure CO levels which would eliminate impairment of the functioning of any human being. The standard is based mainly on a study which found that students exposed to low concentrations of CO and estimated to have blood carboxyhemoglobin contents of about 2% could not correctly distinguish between different time intervals. However, it is pointed out that cigarette-smokers generally have 4-8% COHb in their blood, and that subsequent attempts to duplicate the above findings have failed. In a 1970 study it was reported that 100 subjects exposed to 100 ppm of CO had COHb levels of up to 13% without impairment of their ability to estimate time intervals. Evidence cited in support of the standard is largely unconfirmed. Minute amounts of CO may affect patients with heart and lung diseases in their terminal stages, but it has been found that, with normal subjects, performance is impaired only after the COHb level in the blood reaches 15%. Numerous other criticisms are quoted to indicate that, in adopting the standard, the Environmental Protection Agency has made a serious mistake.

22683

APTIC NO. 41202

Chaumont, A. J. and J. J. Hummelbach

THE OCCUPATIONAL NICKEL DERMATOSIS. (*Die berufliche Nickeldermatose. Berufsdermatosen Aulendorf*, vol. 9:316-320, 1961. Translated from German. 5p. (Presented at the Joint Meeting of the Normannische Gesellschaft fuer Arbeitsmedizin and the Werkaerzte Bayerns, Munich, Germany, May 13, 1961))

Nickel dermatoses were studied in three different galvanizing workshops. Of 25 workers who had direct contact with nickel solutions, seven were taken ill with a nickel dermatosis. Nickel baths with temperatures of 60°C seemed to trigger skin damage more than those at 35°C. Silicone ointments are a poor means of prevention. Ointments produced from ion exchangers (chelates) yield better results.

22684

APTIC NO. 42143

DeBias, D. A., N. C. Birkhead, C. M. Banerjee, L. A. Kazal, R. R. Holburn, C. H. Greene, W. V. Harrer, I. M. Rosenfeld, H. Menduke, N. Williams, and M. H. F. Friedman

THE EFFECTS OF CHRONIC EXPOSURE TO CARBON MONOXIDE ON THE CARDIOVASCULAR AND HEMATOLOGIC SYSTEMS IN DOGS WITH EXPERIMENTAL MYOCARDIAL INFARCTION. *Int. Arch. Arbeitsmed.*, 29(3):253-267, June 1972. 28 refs.

Twelve normal and 12 infarcted animals were continuously exposed (23 hr/day) to 115 mg/cu m carbon monoxide for 14

weeks; 6 normal and 6 infarcted animals were allowed to breathe ambient air. Blood was drawn weekly for hematologic studies, and the ECG was also recorded. The general well being of the animals was assessed by alertness, food and water intake, stool consistency, respiratory and heart rates, body weight, and rectal temperature. At the conclusion of the exposure period the animals were sacrificed for gross and microscopic observation of the heart and other tissues. Throughout the exposure period the animals remained in clinically good health. No obvious signs were noted which could be interpreted as CO induced: serum enzymes or ECG were not characteristically altered; hematologic parameters did not change significantly. Carboxyhemoglobin averaged 14% in animals exposed to CO, and 1.3% in air breathing animals. (Author summary modified)

22685

APTIC NO. 41731

Djuric, Dusan, Ljubica Graovac-Leposavic, Svetislav Milic, and Ljuba Senicar

LEAD CONTAMINATION OF MEZA VALLEY. LEAD MOBILIZATION WITH CA-NA2-EDTA FROM THE BODY OF INHABITANTS. *Pracovni Lekar. (Prague)*, 24(2-3):49-50, 1972. 8 refs.

In 108 persons living near a lead foundry in the Meza Valley, Yugoslavia, lead mobilization was carried out by intravenous injection of 1 g calcium-sodium-ethylene diamine tetraacetic acid. The urine was collected during 24 hr. Only 5.5% of persons excreted less than 0.35 mg Pb/l urine, 18.5% excreted between 0.35 and 0.5 mg/l, the remaining 81.5% excreted 0.5 to 4.2 mg/l. The spontaneously excreted lead represented in persons with normal value of mobilization 7.5 plus or minus 3% of the mobilizable amount, in high values of mobilization only 1.5 to 4%. The authors estimate lead deposition in persons with high values of mobilization to exceed 50 mg/person. (Author summary modified)

22686

APTIC NO. 41677

Duffy, Edward A. and Robert E. Carroll

UNITED STATES METROPOLITAN MORTALITY 1959-1961. *National Center for Air Pollution Control, Cincinnati, Ohio, Health Effects Research Program, PHS Pub-999-AP-39, 212p., 1967. 2 refs.*

Statistics are recorded for each of 201 standard metropolitan statistical areas. Tables included are: observed deaths and indirect age adjusted expected deaths and yearly rates per 100,000 (statistics are provided for each of 68 causes of death); standard metropolitan statistical areas (SMSA) 1960 live births and 1960 census enumeration by age, color and sex; infant and neonatal deaths and mortality rates per 1000 live births by SMSA, color, and sex (seven causes of death evaluated); and total deaths and death rates per 100,000 by SMSA, color, and sex. Computation of rates and interpretation and use of tables are described briefly.

22687

APTIC NO. 41599

Fairchild, Glen A. and Judy Roan

ATMOSPHERIC POLLUTANTS AND PATHOGENESIS OF VIRAL RESPIRATORY INFECTION. I. EVALUATION OF MURINE INFLUENZA AS AN INFECTION DISEASE MODEL. *Arch. Environ. Health*, 25(1):51-59, July 1972. 23 refs.

The contribution of air pollution to the pathogenesis of viral respiratory infection is the subject of increasing attention, but few experimental studies have been reported. Aerosol-induced murine influenza was evaluated as a model through which effects of environmental stresses on the pathogenesis of viral respiratory infection can be studied. Infection rate and amount of pneumonia produced in mice in response to small-particle aerosol exposure to either A2/J305/57 or A/PR8/33 influenza virus are quantitative phenomena closely related to viral exposure dose. Mice are highly susceptible to aerosol-induced in-

fluenza infection. One mouse infectious dose was equivalent to approximately two to three egg infectious doses. The amount of pneumonia which developed in response to the infection and its time course was also related to viral exposure dose. Between the dose range of 1 to 100 MID₅₀ the amount of lung consolidation ranged from between 25 to 60%. The results from exposure to the A2j and PR8 influenza subtypes were similar. (Author abstract modified)

22688

APTIC NO. 41765

Fodor, G.

THE PHYSIOLOGY OF ODOR PERCEPTION. (Zur Physiologie der Geruchswahrnehmung). Text in German. Schriftenreihe Ver. Wasser- Boden-Lufthyg. (Berlin), no. 35:9-14, 1971. (Presented at the Colloquium Geruchsbelastigende Stoffe, Dusseldorf, West Germany, March 18, 1971.)

Odorous gases, vapors, and particulate emissions are unavoidable by-products of numerous technical processes. Although such emissions do not cause real disease, they may considerably affect the well-being of humans. They may cause sickness of the stomach, lack of appetite, headache, and insomnia. The mechanism of odor perception by the human nose is described in detail.

22689

APTIC NO. 41196

Franz, Rolf-Dieter

TOXICITY OF SOME TRACE METALS. (Toxicitaeten einiger Spuremetalle). Arch. Exp. Pathol. Pharmacol., vol. 244:17-20, 1962. 5 refs. Translated from German. 5p.

Lethal doses (LD₁, LD₅₀, and LD₉₉) of eight different trace metallic salts (as chlorides were given to white mice by intraperitoneal injection. Toxicities of trace metal mixtures were also determined. For each metallic salt, six to eight doses increasing logarithmically were tested on 8-16 white mice. Solution concentrations were 0.06 to 0.001 molar. The metal ions were toxic in the following increasing order: molybdenum (+ + + + +), chromium (+ + +), manganese (+ +) iron (+ +), cobalt (+ +), zinc (+ +), nickel (+ +), and copper (+ +). This series corresponds with the Irving Williams Rule which states that the stability of the complexes of the bivalent ions of the first period of the transition metals increases until copper and decreases again at zinc independent of the respective combination. It was found that intra-peritoneal injections of the individual metallic salts over a period of several weeks at intervals of 2-3 days can be tolerated well with injections of the respective half dose of the lower LD₁ probability limit and can be utilized for tests where the animals are meant to remain for a longer time under a high level of the respective metal.

22690

APTIC NO. 42187

Greenberg, S. Donald, Ferenc Gyorkey, Daniel E. Jenkins, and Phyllis Gyorkey

ALVEOLAR EPITHELIAL CELLS FOLLOWING EXPOSURE TO NITRIC ACID. Arch. Environ. Health, 22(6):655-662, June 1971. 15 refs. (Presented at the American Association of Pathologists and Bacteriologists, Annual Meeting, 67th, St. Louis, Mo., March 9, 1970.)

An investigation was undertaken to assess the effect and characterize the changes in the lungs of adult male rats following instillation of nitric acid, since it is postulated that the pathogenesis of emphysema results from a combination of nitrogen dioxide with cellular water, forming weak concentrations of nitric acid and disrupting portions of the alveolar septum. The fine structure of the type 1 and 2 alveolar epithelial cells was demonstrated at different time periods after intrabronchial instillation of dilute (1%) nitric acid. The damaged type 2 cells were partially or largely covered by cytoplasmic extensions of adjacent type 1 cells. This covering is considered to be a mechanism by which the alveolar epithelium maintains an intact surface. Alveolar epithelial cells having the

morphologic characteristics suggesting transition from type 1 membranous pneumonocytes to type 2 granular pneumonocytes were seen. These intermediate type alveolar epithelial cells have large nuclei and microvilli but lacked lamellar bodies. This demonstrates a possible source of origin for the physiologically important type 2 cells. Occasional phagocytosis of carbon particles by type 2 cells was observed. (Author abstract modified)

22691

APTIC NO. 41036

Higgins, E. Arnold, Vincent Fiorca, A. A. Thomas, and Harvey V. Davis

ACUTE TOXICITY OF BRIEF EXPOSURES TO HF, HCL, NO₂, AND HCN WITH AND WITHOUT CO. Fire Technol., 8(2):120-130, May 1972. 13 refs.

Ten rats and 15 mice per group were exposed to a series of atmospheric concentrations of each test material to determine LC-50 (lethal concentration for 50% of the test animals). The animals were exposed in a dynamic flow system using a standard Rochester chamber modified to present the animals with a precisely timed 5-minute inhalation challenge. The animals were observed closely for 7 days following exposure in order to include among the observations any delayed deaths due to pulmonary edema. Hydrogen fluoride produced pulmonary edema of varying degrees of severity in most of the exposed animals. Delayed deaths were routinely seen with this compound in exposures below the LC-50 level of 18,200 ppm in exposed rats, with peak mortality occurring about 24 hr after exposure. Exposure of rats to hydrogen chloride resulted in LC-50 values of 40,989 ppm. The 5-minute toxicity from HCl was much less predictable than from HF. The 5-minute LC-50 value for nitrogen dioxide was 831 ppm for the rats. In hydrogen cyanide exposures, all deaths occurred during the exposure period or within 20 min after exposure. The LC-50 value for rats exposed to HCN was 503 ppm. Carbon monoxide concentrations not hazardous to life did not enhance the toxic effect of the four substances tested.

22692

APTIC NO. 42279

Hodgson, Thomas A., Jr.

SHORT-TERM EFFECTS OF AIR POLLUTION ON MORTALITY IN NEW YORK CITY. Environ. Sci. Technol., 4(7):589-597, July 1970. 19 refs. (Presented at the American Public Health Association, Annual Meeting, 96th, Detroit, Mich., Nov. 1968.)

Mortality, air pollution, and certain meteorological factors during the period November 1962 through May 1965 in New York City were analyzed by multiple regression by use of the least-squares method to obtain quantitative estimates of the relationship between mortality and environmental factors. Mortality from respiratory and heart diseases for ages 64 and under, as well as ages 65 and over, is significantly related to the level of air pollution, with individual categories of respiratory and heart disease mortality being strongly, moderately, or weakly related. The apparent influence of environmental factors on mortality is limited to the immediate increase in mortality that occurs on the day of increased air pollution and extreme temperature and, to a lesser extent, on the following day. Mortality on any given day cannot be attributed to a delayed or cumulative effect of past environmental conditions. (Author abstract modified)

22693

APTIC NO. 41971

Hosogari, Sumi, Sadao Murakami, Hiroshi Kondo, Rintaro Yasuhara, and Hisato Aokei

REGARDING A SURVEY OF ASTHMATIC CHILDREN IN THE ELEMENTARY SCHOOL IN FUKUYAMA CITY. (Fukuyama shinai shogakko jido no zensokuchosa ni tsuite). Text in Japanese. Fukuyama City Medical Assoc. (Japan), Living Environment Research Committee, 15p., March 1972.

A survey was carried out to determine the prevalence of asthma in the following three schools of Fukuyama City in March, 1972. Otsumo and Tomo elementary schools were representatives in the most polluted area. Tsunogo elementary school has comparatively clear air. All the 345 school children in the fourth grade were examined. As the method of survey, first a primary questionnaire was sent to all children in order to request a member of their families to fill it out. As a result, a secondary questionnaire sheet was distributed to the families where there was suspicion of asthma among their children. And further, as a result of the secondary questionnaire, the family members who were suspected of asthma were given a physical examination, direct chest X-rays, blood tests, and a simple lung function test. The response rate of the primary questionnaire was 100% (99.4% for the Tomo elementary school). According to the result of the primary questionnaire, respiratory diseases were noticed in 10-20% of the children, but the children who were diagnosed for the second examination were about half of those examined in the primary examination. The children who had asthma as determined by the third examination were 3 in Otsuma school and 1 in Tomo school. There were no great differences on the average in the physique of children who were diagnosed for the third and final examination, but individually speaking, there were some children whose height was reduced. Decrease of lung function was not generally observed in the case of no asthma. According to the blood sedimentation test, slight acceleration was generally noticed. Observing the period of residence of the children who were diagnosed for the third examination and asthmatic diseases, the period of residence was mostly short. Observing results of the second and third examinations, it was doubtful that there was a relationship between cause and effect concerning present status of subjects and history of family.

22694

APTC NO. 41201

Humperdinck, F.

CADMIUM AND LUNG CANCER. (*Kadmium und Lungenkrebs*). *Med. Klin. (Munich)*, vol. 63:948-952, June 14, 1968. 15 refs. Translated from German. 10p. (Presented at the European Cancer Meeting, Vienna, Austria, July 3-5, 1967.)

Data on possible cancerogenic effects of cadmium and its compounds, obtained from animal experiments and from a survey at a plant manufacturing cadmium hydroxide-nickel hydroxide alkaline dry cells, are reviewed. Six tables which compare observed and expected deaths, age and sex, and age and period of exposure are presented. Results of the review indicate that there is insufficient evidence to link cadmium as a cause of lung cancer (Author abstract modified)

22695

APTC NO. 41154

Ishizaki, R., J. Kabe, H. Nakazawa, K. Nakagawa, Y. Sakai, and T. Matsuya

RESULTS OF DETAILED EXAMINATIONS OF CHRONIC RESPIRATORY PATIENTS AMONG TOKYO AREA JAPAN TELEPHONE AND TELEGRAPH CO. WORKERS. (*Nihon Denden Kosha Tokyo chiku shokuin kenshin yori chushutusu shita mansei kokyuki shikkan kanja no seimitsu kenshin seiseki*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):57, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Health examinations were given to the workers of the Japan Telephone and Telegraph Corp. who were diagnosed as chronic respiratory patients. They were 29 chronic bronchitis, 10 tuberculosis, and 2 asthmatic patients. Questionnaires, examinations of phlegm, cardiograms, blood pressure tests, respiratory capacity tests, chest X-rays, blood tests, and immunological tests were given. Some of findings were: the chronic bronchitis group had a high rate of acidophile cells in their phlegm. Percentage vital capacity and one-second rate for

the tubercular and asthmatic groups were very low, but bronchitis groups showed no differences from the control group. Air duct resistance was high among the tubercular and asthmatic groups. Various examinations and chest X-rays were compared, general agreements were recognized between X-ray results and the one-second rate and the air duct resistance. Hematologically, 21 globulin was high in the chronic bronchitis group. These findings and the respiratory capacity records had no correlations.

22696

APTC NO. 42119

Islam, M. S., E. Vastag, and W. T. Ulmer

SULPHUR DIOXIDE INDUCED BRONCHIAL HYPER-REACTIVITY AGAINST ACETYLCHOLINE. *Int. Arch. Arbeitsmed.*, 29(3):221-232, 1972. 20 refs.

The effect of sulfur dioxide on the bronchial reactivity against acetylcholine (ACH) was determined in 25 dogs. The dogs were exposed initially to acetylcholine aerosol, then to SO₂ for 1 hr and again to ACH. Three such cycles were repeated. The concentrations of SO₂ used were 1, 2, 5 and 10 ppm and the controls were given room air in place of SO₂. The parameters studied were intrathoracic pressure as the indicator of broncho-constriction, blood oxygen and carbon dioxide, tidal volume, respiratory rates, and arterial blood pressure. All of the SO₂ exposed animals showed a significant increase of bronchial sensitivity. Maximum sensitization was induced by 2 ppm. The reactions provoked by 1 and 5 ppm were almost of the same order and little smaller than 2 ppm, but greater than those produced by 10 ppm. The peak reactions against ACH observed for 1, 2 and 5 ppm were 3, 2 and 1 hr of exposure, respectively. After attaining the peak points, the reactions declined in all the three groups. No such trend was obtained for those animals exposed to 10 ppm of SO₂. The role of small concentrations of SO₂ as bronchial sensitizing agents against ACH is discussed. (Author summary modified) 0

22697

APTC NO. 41480

Joetten, K. W., H. Reploh, and G. Hegemann

EXPERIMENTAL INVESTIGATIONS OF MANGANESE PNEUMONIA AND BASIC SLAG PNEUMONIA. (*Experimentelle Untersuchungen ueber die Manganpneumonie und ihre Beziehungen zur Thomasschlackenpneumonie*). *Arch. Gewerbepathol. Gewerbehyg.*, vol. 9:314-336, 1959. 13 refs. Translated from German. Scientific Translation Service, Inc., Santa Barbara, Calif., 27p.

The etiological mechanism of manganese pneumonia and basic slag pneumonia as a typical occupational disease found among manganese workers was investigated in animal experiments to determine the pathological changes caused by the dust and the effects of climatic factors, additional influences, and infection with pneumococci in the onset of the disease. In the first series of tests, 32 rabbits were dusted with brownstone dust daily for 1 hr. After 19 days, 28.1% of the animals were dead. With one exception, they all showed infected lung changes which had progressed to extensive broncho-pneumonia centers. Of the remaining animals, 16 were infected with pneumococci Type II intranasally, along with 4 control animals; 8 of these were also exposed to dust for 15 minutes daily. Manganese dust by itself caused a mortality rate to 57% and more strongly developed pulmonary changes, while additional infection during the same period increased the mortality rate to 75% and caused considerably more lung tissue damage. Additional ventilation increased mortality to 87% and caused very extensive pneumonic pulmonary changes. The four rabbits infected with pneumococci only showed no pathological changes. A second experimental series of tests were run with mice to determine the pathogenetic significance of the added effect of pneumococci. The severest pneumonia was produced by damaging the respiratory tract with ether anesthesia and introduction of inactivated pneumococci in addition to brownstone inhalation. The relationship between the etiology of manganese and basic slag pneumonia was investigated in a

third series using limestone because of the approximately equal content of calcium oxide as found in basic slag dust. Even 10% manganese dust caused confluent pneumonia in rabbits and considerable primary mortality, while limestone dusting resulted in a very minor overall mortality and only one regular pneumonia, thus confirming the role of manganese in basic slag as the damaging agent. The damaging nature of manganese dust was further investigated with regard to particle size, chemical effect, and histological lung changes.

22698

APTIC NO. 41171

Kojima, Tohru

CHLOROBIPHENYLS IN SPUTA AND TISSUE. *Fukuoka Igaki Zasshi (Fukuoka Acta Med.)*, 62(1):25-29, 1971. 7 refs. Translated from Japanese. 9p.

A study was conducted to determine if the sputum of patients with chlorobiphenyl poisoning contained any of the chemical. The sputum samples were collected intermittently between December 1969 and July 1970. They were analyzed by gas chromatography, together with tissue samples from the patients. Components of chlorobiphenyls with late retention times were always detected in the sputa before May 1970 and rarely in the samples after June. However, the components showed markedly in the fatty tissue of the patients. Based on these results, it is assumed that chlorobiphenyls deposited in fatty tissue do not pass into the blood; therefore, chlorobiphenyls are rarely found in the sputum, even after a long period of intoxication. (Author abstract modified)

22699

APTIC NO. 41174

Kuroiwa, Yoshigoro, Yoshiyuki Murai, and Tetsuji Santa

NEUROLOGICAL AND NERVE CONDUCTION VELOCITY STUDIES ON 23 PATIENTS WITH CHLOROBIPHENYLS POISONING. *Fukuoka Igaki Zasshi (Fukuoka Acta Med.)*, vol. 60:462-463, 1969. Translated from Japanese. 4p.

In 23 patients with chronic chlorobiphenyl poisoning, neurologic examinations and measurements of nerve conduction were conducted. Of the 23 cases, 10 showed symptoms of sensory neuropathy such as numbness, pain, and hypoesthesia, and one revealed areflexia. Motor functions were intact in all cases. Slowing of sensory nerve conduction velocities of radial and/or sural nerve were observed in nine cases, in contrast with motor nerve conduction velocities of ulnar and tibial nerves, which decreased in two cases. It is concluded that the sensory nerve fiber is predominantly involved in chlorobiphenyls polyneuropathy. (Author abstract modified)

22700

APTIC NO. 41507

Landahl, Herbert D.

THE EFFECT OF GRAVITY, HYGROSCOPICITY, AND PARTICLE SIZE ON THE AMOUNT AND SITE OF DEPOSITION OF INHALED PARTICLES, WITH PARTICULAR REFERENCE TO HAZARD DUE TO AIRBORNE VIRUSES. In: *Assessment of Airborne Particles*. I. T. Mercer, P. E. Morrow, W. Stoerber (eds.). Springfield, Ill.: Charles C. Thomas, 1972. Chapt. 21, p. 421-428. 19 refs.

Calculations were carried out to assess the effect of gravity, hygroscopicity, and particle size on the retention of airborne particles in various parts of the respiratory tract. The absence of gravity can substantially reduce deposition of small particles in the deeper regions, while hygroscopicity can considerably increase retention. The reduced deposition in the lungs in the absence of gravity can result in an increased deposition in the nasal passages. An attempt was made to use the calculations to assess the hazard due to airborne viruses. For coxsackievirus A type 21, rhinovirus type 15, and adenovirus type 4, a comparison was made between the threshold infection dose obtained by administration of virus in nasal drops and the estimated deposition of airborne virus in

the nasal passages. In the case of adenovirus type 4, the calculations indicated that the deposition in the lungs of three virus particles, mostly single virions, gives a 50% chance of infection. (Author abstract)

22701

APTIC NO. 41737

Lange, Gerhard

HEALTH HAZARDS DUE TO GASEOUS EMISSIONS FROM INDUSTRY, FIRINGS AND AUTOMOBILES. (*Gefährdung der Gesundheit durch Abgabe von Industrie, Feuerungen und Kraftfahrzeugen*). Text in German. *Med. Monatsschr.*, 25(3):97-99, 1971. 13 refs.

The effects of different air pollutants from industrial sources, firings, and automobiles on man are reviewed. Sulfur dioxide, ozone, nitrogen oxides, carbon monoxide, hydrocarbons, and lead compounds are the pollutants that are most dangerous to human health in urban and industrial areas. Sulfur dioxide, in concentrations above one ppm, irritates the mucous membranes of the respiratory tract and the eye. Data on the relation between disability, diseases of the respiratory tract, and mortality and SO₂ concentrations above 0.2 ppm are available. Ozone concentrations above one ppm both irritate the mucous membranes, and may cause lung edema and headache. The maximum allowable concentrations for 1 by 8 hr-exposure is set at 0.1 ppm. Nitric oxide causes dyspnea, nausea, and unconsciousness, while the more toxic nitrogen dioxide is responsible for irritations of the mucous membranes, cough, salivation, and dyspnea as well as lung edema, after three to 24 hours latency. Carbon monoxide forms carboxyhemoglobin in the blood, inhibits brain functions, and may cause tissue damages due to chronic poisoning. The maximum allowable concentration is 50 ppm. Different hydrocarbons, present primarily in automobile exhaust, may cause irritation of the mucous membranes, cough, nausea, euphoria, narcosis, and some have a carcinogenic effect. The frequency of lung cancer was found to be higher in urban than in rural areas. Hydrocarbon emissions from automobiles can be reduced by improving combustion, and by applying after burning. The tetraethyl lead added to gasoline is present in the exhaust in the form of lead oxide, chloride, or bromide. Lead incorporated in the organism may cause basophilia of the erythrocytes, porphyrinuria, swollen liver, and encephalopathy. Correlation between lead concentrations in air and blood was established. Though the actual values lie far below the maximum allowable concentration of 200 micrograms/cu m, risks are present due to the contamination of plants near highways. The synergism of different air pollutants as well as air pollutants and drugs is a possibility.

22702

APTIC NO. 41205

Leonov, A., I. K. Gurskaya, V. I. Medvedeva, and M. V. Chichko

DISTURBANCES IN MN, NI, CR, CU AND MO EXCHANGE BETWEEN MOTHER AND FETUS IN LATE PREGNANCY TOXICOSES. (*Naruseniya obmena Mn, Ni, Cr, Cu i Mo mezhdu mater yu i plodom pri pozdnikh toksikozakh beremennosti*). Dokl. Akad. Nauk Beloruss. SSR, 15(7):656-657, 1971. 6 refs. Translated from Russian. 4p.

Disturbed manganese, nickel, chromium, copper, and molybdenum exchange between mother and fetus during pregnancy toxicoses was studied by determining the metal exchanges in the blood of 25 new mothers suffering toxicoses in the first half of pregnancy, in 26 of their newborn infants, in the blood of 120 new mothers with late pregnancy toxicoses, and in 124 of their newborn infants. As a control group, 110 new mothers with normal pregnancy and delivery and their 112 newborn infants were examined. It was established that the amount of Mn, Ni, Cr, Cu, and Mo does not change in the blood of new mothers and infants in connection with toxicoses in the first half of pregnancy. A significant increase was revealed in the amount of copper in the blood of new mothers suffering tox-

icosis in later pregnancy and a decrease in the amount of that element in the blood of infants. With greater severity of the toxicosis, the concentration of copper in the blood of new mothers is increased and that of molybdenum decreases.

22703

APTIC NO. 41057

Lindquist, Valdemar A. Y.

CARBON MONOXIDE: ITS RELATIONSHIP TO AIR POLLUTION AND CIGARETTE SMOKE. *Public Health (London)*, 86(1):20-26, 1972. 42 refs.

The effects of carbon monoxide, found in air pollution and in cigarette smoke, on human health are discussed. At times of heavy air pollution the smoker has higher levels of carboxyhemoglobin due to the additive exposure and to the fact that CO exertion from the lungs is impaired when the partial pressure of the gas in the ambient air is increased. The main effect of CO is to impair oxygen transport. It does this by combining with hemoglobin and by increasing the affinity of the remaining hemoglobin for oxygen. This causes the tissue oxygen tensions to drop lower than would be expected for the unloading of oxygen from the blood. Small doses of CO have been shown to lower arterial oxygen tension. A study on healthy, non-smoking volunteers showed that artificially elevating the COHb to 12.5% over an 8-day period lowered tissue oxygenation at rest by 15 to 20%. There appears to be direct correlation between the incidence of premature births, as shown by birth weight, and severity of smoking. The stillbirth rate is about 40% higher. This effect may be due to the action of nicotine. The deleterious effects of cigarette smoking on the heart may be explained by the interaction of C/Hb and nicotine, the former decreasing oxygen availability and the latter increasing cardiac work. The brain is very sensitive to small doses of CO. Impairment of visual discrimination and the precision and judgment of time intervals can occur with COHb levels as low as 4-5%.

22704

APTIC NO. 41973

Mutsuo, Doi, Satoko Sekizawa, Shigeru Nagaoka, Takashi Watanabe, and Takahito Suzuki

STUDIES OF THE EFFECT OF PHOTOCHEMICAL SMOG ON THE HUMAN BODY: RESULTS OF INVESTIGATION BY QUESTIONNAIRE IN RISSHO JUNIOR AND SENIOR HIGH SCHOOLS AND TURUKAWA HIGH SCHOOL IN TOKYO. (*Kokagakuamoguo no jintai eikyo ni kansuru chosa: Tokyo Rissho Chugaku, Kotogakko oyobi Tsurukawa Kotogakko ni okeru anketo chosa seiseki*). Text in Japanese. Tokyo to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), 3(3):221-239, 1972. 13 refs.

So-called photochemical smog episodes occurred in and around Rissho junior and senior high schools in Horinouchi in Suginami ward on July 18, 1970, and the same episode then occurred in Tsurukawa high school in Machida city on Aug. 5. Retrospective investigation by questionnaire was carried out, in order to record the situation of damages to the human body during the episode as exactly as possible. The investigation was performed at Rissho on Dec. 9, 1970 and at Tsurukawa on Feb. 1, 1971. The questionnaire was composed of: personal past history, history of members of the family, personal health condition during the episode, location during episode, symptoms, health condition after episode. The main bodily damages in both areas were caused by optic symptoms, such as eye irritation. Severe symptoms, for example throat and lung symptoms, convulsions, and loss of consciousness also occurred. According to quantity of motion, difference of outdoors or indoor location during the episode, and unmeasured individual variation, these symptoms were noticed. They were presumed to appear mainly because of high concentrations of oxidants. However, it was difficult to clarify the causes of episodes by results of these studies.

140

22705

APTIC NO. 41157

Matsuoka, S., T. Kiumura, K. Tahara, H. Kondo, M. Kondo, and K. Takeda

DISPERSION OF DUSTS FROM A CHROMIC ACID MANUFACTURING PLANT. (*Kuromusan seizo kojo kara no funjin no hisan ni tsuite*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):38, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

On May 29, 1969, an accidental emission of dust particles of sodium dichromate from a chromic acid manufacturing plant in southern Tokushima resulted in damages to human health and plants. The amount of particles scattered in the air was presumed to be 2 kg in the Na₂Cr₂O₇·2H₂O form for 30 min. The amount and the particle sizes were not confirmed, but the approximate ground concentration at a distance of 0.2 km from the source was conjectured to be between 50 to 150 micrograms/cu m. Twenty-eight inhabitants in 0.2 km leeway experienced an acute pain in their throats, a general discomfort, heavy head, and fatigue in their entire bodies. Acute laryngitis and rhinitis were diagnosed. Patients all recovered within two weeks following the accident and no after effects were felt. Internally, partial albuminuria was detected. With regard to agricultural products, main damage was recognized on rice plants. Lower leaves showed brown-black necrosis and 0.85 to 72 ppm Na₂Cr₂O₇·2H₂O were detected from the leaves. Approximately 51 ppm were found in weeds. For about a month after the incident, Cr₃ in the air was measured by hi-volume air samplers. The measurements ranged from 0.11 to 0.70 mg/N cu m, averaging at 0.40 mg/N cu m.

22706

APTIC NO. 42107

McCarroll, James, Michael D. Lebowitz, Eric J. Cassell, Doris Wolter, and Donovan J. Thompson

HEALTH AND THE URBAN ENVIRONMENT. *J. Occupational Med. (Ottawa)* 14(4):309-316, April 1972.

A problem of much interest in recent years is to determine what variations in health may be related to variations in the environment to which persons are exposed. A three year study was conducted in the lower east side of Manhattan in which a cross section of income group, ethnic groups, and geographical distribution was selected. A questionnaire was developed concerning health variations or the appearance of symptoms; a total of 1750 persons were interviewed with an average of 48 weeks study of an individual. The questionnaire concentrated on acute respiratory illness and gastrointestinal illness in addition to chronic symptoms. An air pollution monitoring station was set up in the center of the study area to obtain continuous profiles of sulfur dioxide, particulates, carbon monoxide, and hydrocarbons. Meteorologic factors were also accumulated. It was found that the 15 most common acute symptoms occurred in frequencies expected of a normal population. The prevalence of four symptoms (cough, common cold, eye irritation, and headache) were broken down into four groups: children under age 15, adults, heavy cigarette smokers, and non-cigarette smokers. Cough and common cold were more prevalent among children; eye irritation and headache were more common among adults. Correlation coefficients daily symptom prevalence and daily averages of air pollution are presented; no direct relationship was found between a symptom and a level of air pollution. The interrelations of symptom prevalence rates are with pollutants and meteorological phenomena indicate that a multiple correlations are higher than single pair correlations and that these are statistically significant. Associated relationships between symptoms in a normal urban population and a variety of environmental factors, including air pollution, were found. No one factor, including air pollution, acts alone to produce a significant proportion of the common illnesses from which persons suffer. 0

22707

APTIC NO. 41485

Miyaji, Kazumi and Hideo Kashiwagi

AIR POLLUTION AND RESPIRATORY DISEASES IN THE YOKKAICHI DISTRICT. THE NATURE OF YOKKAICHI ASTHMA. (*Yokkaichi chiike ni okeru taiki osen to kokyu shikkan. Iwayuru Yokkaichi zensoku no byokei ni tsuite*). *Nippon Kyobu Rinsho* (Japan. J. Chest Diseases), 28(4): 250-261, 1969, 25 refs. Translated from Japanese. Translation Consultants, Inc., Arlington, Va., 28p.

The relationship between air pollution and respiratory diseases was epidemiologically investigated in the Yokkaichi district of Japan. The Yokkaichi region is industrial in nature, with several petrochemical combines; the major pollutant, therefore, is sulfur dioxide with a recent emphasis on sulfur trioxide mist. Air quality measurement data on SO₂ and SO₃ mist concentrations as a function of season, winds, and area were correlated with outbreaks of asthmatic diseases, i.e., chronic bronchitis, bronchial asthma, emphysema, and other respiratory diseases. The clinical signs of the Yokkaichi asthma were studied for determinations of diagnostic standards, lung functions and disease types, distribution by disease and age, and the interrelationship between disease types. The emphysema in Yokkaichi was a transition from bronchial asthma rather than from chronic bronchitis, this is probably due to the relatively pure nature of the pollution caused by the petroleum fuels, principally heavy oils.

22708

APTIC NO. 41933

Molina, M. Cl., G. Akoun, J. Chretien, G. Decroix, G. Dorsit, and P. Galy

COLLOQUIUM ON LUNG ALLERGIES TO ORGANIC DUSTS. (*Table ronde sur l'allergie pulmonaire aux poussières organiques*). Text in French. *Cah. Med.*, 1(1): 35-58, 1972.

Pneumopathies of an allergic nature (intrinsic immunological pneumopathies) caused by the inhalation of organic dust are characterized as diffuse pneumopathies generally without bronchospasm which can be detected on X-rays as diffuse micronodular manifestations which restrict alveolar-capillary diffusion. These pneumopathies thus represent an alveolar and interstitial impairment inducing the formation of epithelioid or giant cell granulomas. The serum of affected persons contains antibodies against the inhaled organic dust. Originally observed on rural populations and termed farmer's lung disease, the affection with the same symptomatology and pathogenesis occur also in urban populations. It occurs in a subacute, acute, or chronic form. The acute form appears 6 to 8 hr following exposure (handling hay - exposure to birds) and disappears in 1 to 3 days. The subacute form has a protracted course which is aggravated by each new exposure. The chronic form is less frequent and is manifested by dyspnea whose cause is difficult to trace to antigenic exposure. Complete cure can be achieved by complete avoidance of the allergens; corticoids are helpful in acute and subacute forms, not in the chronic form. Spirography registers in most cases ventilatory restriction; oxyhemoglobin denaturation occurs as in the Baldwin, Courmand, and Richard syndromes due to impaired alveolar-capillary diffusion. Inhalation tests by means of allergen extracts which induce the above symptoms should be used as a diagnostic means only in doubtful cases where functional tests were inconclusive and in the absence of precipitins in the blood. Ultramicroscopic observation of bioptic pulmonary tissue reveals vascular lesions which are not visible in conventional microscopy. Diagnosis of diffuse allergic granulomatosis by immunological tests usually comprises negative skin reaction to common pneumallergens including hay and fungi, frequently a negative tuberculin reaction, and the presence of specific precipitins. The disease appears to reflect an antigen-antibody conflict. The farmer's lung disease is caused by thermophile Actinomyces from mouldy hay, the identical affliction contracted by keepers of birds stems from Thermactinomyces vulgaris.

22709

APTIC NO. 41198

Mueller, R. and G. Breucker

COBALT AS AN OCCUPATIONAL ECZEMATOGEN AND AS COUPLING ALLERGEN WITH CHROMIUM AND NICKEL. (*Kobalt als arbeitsbedingtes Ekzematogen und als Koppelungsallergen mit Chrom und Nickel*). *Dermatol. Wochenschr.*, 154(12): 276-282, March 23, 1968, 45 refs. Translated from German. 12p.

Patch tests were performed on 1006 test subjects with suspected contact eczemas during 1964-66. In 92 (9.1%) of these patients, a cobalt allergy was demonstrated by positive test results. The test substances included cobalt nitrate in a 2% solution, nickel sulfate in a 5% solution, and potassium in a 0.2% and 0.5% solution. With 26 of the test subjects, a trivalent hypersensitivity existed toward the three test substances. In four patients the sensitization could be traced back to contact with cattle fodder which contained cobalt. In addition, the occurrence of combined sensitization towards cobalt, nickel, and chromium in the individual occupational groups was investigated, where the dependence of sensitization of exposure emerged as evidence in support of the theory of coupling allergy. (Author summary modified)

22710

APTIC NO. 41934

Nakamoto, Akiyoshi and Shizutomo Katsuta

EPIDEMIOLOGICAL STUDY RELATED TO AIR POLLUTION IN YOSHIIJIMA, HIROSHIMA CITY. PREVALENCES OF RESPIRATORY SYMPTOMS IN ADULTS. (*Hiroshima-chi Yoshijima chuku ni okeru taikosen no eikyo ni kansuru igakuteki chosai*). Text in Japanese. *Hiroshima Igaku* (J. Hiroshima Med. Assoc.), 25(4): 483-485, April 1972, 12 refs.

A study was done to determine the effects of air pollution on the respiratory system and on the health of the population of a polluted area (Area A), where there is a municipal incinerator. Area B was selected as a control. Fifty-six persons from Area A and 50 from Area B were chosen as the subjects of the investigation. They were all women who had little smoking history and were not engaged in dusty industrial work. Those who had resided in Area A less than 20 years amounted to 100%, and in Area B more than 21 years amounted to 82%. No significant difference was shown between the two areas in regard to cough, sputum, shortness of breath, and wheezing. The sputum examination, however, indicated that 20 cases from Area A and 7 from Area B were troubled by sputum upon arising in the morning, and that much higher proportion of those from Area A had nasal catarrh. The x-rays showed that few had chest ailments and that very little difference was shown between the two areas. A rather large number of those who had abnormal chest x-rays had findings similar to granular or abnormal lineal shadow according to x-ray classification categories in the pneumoconiosis law in this country. The pulmonary function examination revealed that 14.6% from Area A and 8.0% from Area B were low in their lung capacity, low meaning less than 79% of the full capacity. Nine percent from Area A and 6.0% from Area B had obstructive impairment, which meant that the rate/sec was below 69%. The electrocardiograms also showed no significant difference between the two areas, and even those who were abnormal had no signs to imply pulmonary or right ventricular hypertrophy. No noteworthy abnormality was shown in other findings. The effects of air pollution are greater in Area A than in Area B, and, therefore, it is necessary, from now on, to keep a continuous health survey on the inhabitants in Area A.

22711

APTIC NO. 41984

Nakamura, Ryuichi

EFFECTS OF AIR POLLUTION BY SULFUR DIOXIDE UPON MOTHERS AND BABIES. (*Aryusangas taikiosen ga hoji ni oyobosu eikyo ni tsuite*). Text in Japanese. *Shusanki Igaku* (Prenatal Med.), 2(1): 110-122, March 1972.

Mothers and newborn babies delivered at Oshiohara Hospital in Mie Prefecture and various health statistics were classified according to Law concerning Special Measures for the Relief of the Pollution Related-Patients. Inhabitants were divided into polluted areas (P.A.) and non-polluted areas (N.P.A.), compared, and discussed for clinical findings, stillbirth death rate, and premature birth rate. The yearly mean values of sulfur dioxide concentration tended to increase from 1961 through 1969, indicating 0.66-2.10 for P.A. and 0.18-1.17 (sulfur trioxide mg/day 100 sq cm) in N.P.A. There is no proof that air pollution by SO₂ causes a noticeable impairment upon the mother's function, except for especially high pollution. But the rate of stillbirths at the middle stage of pregnancy has increased with the worsening of the air pollution. The premature birth rate in 1968 was about 503.27 g in N.P.A. and about 522.01 g in P.A.; an increased tendency was discovered in the body weight of newborn. Sulfur dioxide probably does affect the fetus. Although there was no significant difference statistically in the rate of malformation, observations over a long period of time are needed considering effects upon fetuses and newborn babies.

22712

APTIC NO. 41717

Nikkanen, Jorma, Sven Hernberg, and Sakari Tola

MODIFICATIONS OF THE DELTA-AMINOLEVULINIC ACID DEHYDRATASE TEST AND THEIR SIGNIFICANCE FOR ASSESSING DIFFERENT INTENSITIES OF LEAD EXPOSURE. *Work Environ. Health (Helsinki)*, 9(1):46-52, 1972, 19 refs.

When the content of lead in blood (Pb-B) is normal, human erythrocyte delta-aminolevulinic acid dehydratase (ALA-D) activity has its pH optimum at 6.4. Another lower peak occurs at pH 6.8. When Pb-B is elevated, e.g., in occupational exposure, the pH optimum shifts to 5.8 and there is no other activity peak. Delta aminolevulinic acid dehydratase activity increases in a linear manner as a function of time for periods between 15 and 90 minutes. Storage of whole blood at +5°C results in some loss of activity. By using different pH values for the enzyme assay, the sensitivity of the ALA-D test can be altered. The test is most sensitive at pH 6.8, and considerably less sensitive at pH 5.8. The highest correlation coefficient between Pb-B and ALA-D (r equals minus 0.96) was obtained at pH 6.4, however. At this pH, the ALA-D test is accurate at Pb-B levels up to 100 micrograms/dl. For routine purposes, therefore, pH 6.4 is recommended. If very high Pb-B values are expected, pH 5.8 can be tried since the amount of porphobilinogen formed during incubation is measurable even when Pb-B is 150 micrograms/dl or more. The dependence of the pH optimum of Pb-B is compatible with an allosteric inhibition. The mechanism is apparently different when lead is added to the hemolysate in vitro, since the pH optimum remains the same as that for normal blood. (Author abstract modified)

22713

APTIC NO. 41749

Ogata, Masana, Sumiko Ohmori, and Hirokazu Osaki

THE CHART FOR SCREENING OBSTRUCTIVE DISORDERS OF THE LUNG OF PUPILS BY MEANS OF PEAK FLOW RATE. PART I. STUDIES ON AIR POLLUTION AND PUBLIC NUISANCE. (*Piku furo chi ni yoru seito no haiheisoku sei shogai o yusuru to omowareru mono no sukuringu ho ni tsuite*). Text in Japanese. *Nippon Koshu Eisei Zasshi (Japan. J. Public Health)*, 15(5):477-482, May 1968, 7 refs.

In order to screen out pupils suffering from obstructive disorders of the lung, it is necessary to select the pupils having a lower peak flow rate compared with vital capacity or the area of the body surface. For this purpose, a chart was devised that indicates the regression line between the vital capacity and the area of body surface on one hand and the peak flow rate and the line showing its confidence interval on the other. The subjects consisted of elementary school and junior high school male pupils residing outside industrial districts where air pollu-

tion presents health problems. By means of the chart showing the regression line and the line showing confidence interval, a method was established of screening out the persons suffering from obstructive disorders of the lung. Peak flow rates/subject were measured five times; the correlation coefficient between the maximum value and the arithmetic mean of the fourth and fifth values was 0.98. The correlation between the vital capacity and the peak flow rate was 0.59 in pupils of the sixth grade of elementary school, 0.59 in those of the first year of junior high school, 0.51 in those of the second, and 0.43 in the third. The correlation coefficient between the area of body surface and the peak flow rate was 0.59 in pupils of the sixth grade, 0.58 in those of the first year of junior high school, 0.49 in those of the second year, and 0.59 in those of the third year. These results suggest that it is necessary to select those subjects having a lower peak flow rate for the vital capacity or the area of body surface. Pupils having obstructive disorders of the lung can be screened more thoroughly by the use of confidence interval from the regression line and critical ellipsoidal region by a modified contour method.

22714

APTIC NO. 41720

Ohkawa, Hironori, Toyoho Tanaka, and Kunikazu Ohashi

THE INFLUENCE OF DOP FUME ON ANIMALS AND PLANTS. (*DOP fumu no do shokubutsu e no eikyo*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 6(1):172, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan. Oct. 27-29, 1971.)

The effects of dioctyl phthalate (DOP) fume on plants and animals were studied by field investigation and experiments. Potted plants of turnips were distributed in the surroundings of a factory. Exposure tests were carried out on turnips, radishes and Chinese cabbages at a DOP fume concentration of 400 l 80 mg/cum. After more than 5 hours of exposure, all the leaves of the three plants showed necrosis. The same symptom was shown by the potted turnips distributed in the surroundings of the factory. All mice exposed to the same concentration died in 19 to 22 days. Symptoms in the digestion and excretion systems of dogs were also found after 60 days of exposure. Investigation by questionnaires revealed that the health of human beings was also affected by the fume.

22715

APTIC NO. 41584

Penha, P. Daniel, Leonard Amaral, and Seymour Werthamer

OZONE AIR POLLUTANTS AND LUNG DAMAGE. *Ind. Med.*, 41(3):17-20, March 1972. (Presented at the Symposium on Air Pollution and Respiratory Disease, 7th Annual.)

The histology of the lung obtained from a tumor-resistant strain of mice exposed to a daily concentration of 2.5 ppm by volume of ozone for 2-hour periods, five days a week for five weeks was studied. Of the ozonized group of animals, 37% showed cellular alterations including such changes as hyperplasia, atypical hyperplasia, and pulmonary adenomas. Altering the experimental conditions so that the animals were exposed to a concentration of ozone of 4.5 ppm for 2 hours every other day for a period of two and a half months resulted in extensive inflammatory and cellular changes, suggesting true premalignant lesions. As a consequence of the premise that biochemical parameters must be altered much earlier in time prior to morphologic manifestations, the biochemical characteristics of the cellular constituents in the lung influenced by ozone prior to any overt histologic change were studied. Changes in lung enzyme levels were noted from the first day of exposure. The marked increase in pulmonary DNA synthesis which was noted among the ozonized animals after 30 days of exposure was traced to the activity of the epithelial cells. Electron microscopy revealed cellular changes in the tracheal pseudostratified epithelium and the bronchiolar-alveolar junction.

22716

APLIC NO. 41695

Pines, A. G.

THE CONDITION OF SOME GENERAL INDICATORS IN LEAD POISONING. (*Sostoyanie nekotorykh pokazateley obshchey reaktivnosti pri svintsovykh intoksikatsiyakh*). Text in Russian. *Vrachebnoe Delo* (Kiev), no. 196, 1962 (1).

The variations of some parameters of the overall activity due to chronic lead poisoning were studied in 40 persons occupationally exposed to lead over more than 10 years. Reduced functional activity of the hypothalamus-hypophysis-adrenal gland system was observed in the majority of all cases. The urine lead content was 0.05 mg/l, maximum, and the basophilic granular erythrocyte count was 2-28/10,000. The percentage of reticulocytes was between 0.4 and 3.3. Spontaneous 17-ketosteroids excretion was decreased to 6.57 ± 0.74 mg/day. The decrease in the 17-ketosteroid excretion after epinephrine administration, observed in 21 cases, indicated inadequate, distorted reaction. Eosinopenia was found in more than 50% of all cases. Correlation between the degree of the adrenocortical hypofunction and the clinical gravity of the poisoning was established. The total serum protein content showed a slightly rising tendency, while decreased albumins and increased gammaglobulins were determined. The decrease in the skin test coefficient revealed a reduced functional activity of the connective tissue system. Granulocytopenia, eosinopenia, retarded erythrocyte sedimentation reaction, as well as distorted or attenuated leukocyte reactions, observed in several cases in the peripheral blood, indicated the inability of the regulatory apparatus to react adequately upon the corresponding loads.

22717

APLIC NO. 41481

Replsh, H.

INDUSTRIAL DUST AND PNEUMONIA. (*Gewerbstaub und Lungenerkrankung*). Arch. Hyg. Bakteriol. (Munich), vol. 131, 16-21, 1943, 12 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 10p., July 1971.

The lung-damage potential of various industrial dusts in conjunction with infection with pneumococci was investigated. Mice which were pretreated by inhaling killed pneumococci and eight days later were infected with live pneumococci placed in their noses or throats showed strong lung damage after inhalation of various dusts. Mice which were not pretreated generally showed little or no lung damage after exposure to dust. The dusts used in the experiments were manganese dioxide, Siemen-Martin oven dust with a 7-9% manganese content, Thomas slag dust (containing silicates and silicon dioxide), aluminum dust, and calcium sulfide dust. (Author summary modified)

22718

APLIC NO. 41515

Rondia, D.

EFFECTS OF LOW CARBON MONOXIDE CONCENTRATIONS ON LIVER ENZYMES (*Wirkung niedriger Kohlenmonoxid-Konzentrationen auf Leber-Enzyme*). Text in German. *Staub, Reinhaltung Luft*, 32(4):163-164, April 1972.

Numerous studies have shown that microsomal enzymatic activities require an electron-transport chain which contains the cytochrome inhibited by CO like hemoglobin. The influence of apparently harmless doses of 60-150 ppm CO for two to seven days on Wistar rats was examined by measuring the rate of activity of two enzymatic systems aromatic hydrocarbon hydroxylase and cholesterol-7- α -hydroxylase in the rat liver. When the results are expressed as the percentage of activities found in control animals, after five days of exposure the activity of the first enzyme was lowered from 15 to 20%; the activity of the second enzyme was slightly but significantly increased, even on the second day of exposure. When the need for oxygen in the liver was artificially increased by inducing

the enzymatic complex with either benzopyrene or methylchoanthrene, the decrease of aromatic hydrocarbon hydroxylase activity was 40% lower than that of control rats induced. If induction is obtained through phenobarbital injection, the decrease of activity is limited to about 20%. In both cases, there was little change in the activity of cholesterol hydroxylase. In the same experiments, the total protein content and the cytochrome P-450 content of the liver were not modified by CO, and the influence observed was not due to hypoxia.

22719

APLIC NO. 41978

Roussel, Andre

AIR POLLUTION AND HUMAN HEALTH. (*La pollution atmosphérique et la santé de l'homme*). Text in French. *Pollut. Atmos. (Paris)*, 14(54):134-136, April-June 1972.

Health aspects of air pollution are outlined. The health hazards of air pollution are undeniable, and gases, aerosols, and fine dust below 5 micron are most dangerous. Both investigations and case studies revealed the cumulative effect of different air pollutants. Carbon monoxide contained in automotive exhaust affects the central nervous system causing psychological and visual troubles, and nitrogen dioxide and nitric oxide give rise to respiratory troubles. Ozone may irritate the mucous membranes. Four different levels have been determined on the basis of physiopathological sensorial responses to different pollutant concentrations with varying exposure times (concentrations and corresponding exposure times without direct or indirect effect, such with irritant and noxious effect, causing physiological troubles or alterations resulting in acute diseases or premature death, as well as concentrations and exposure times causing acute diseases or premature deaths in groups sensitive to pollution). Pollution standards will be elaborated in an increasing number of countries in the near future.

22720

APLIC NO. 41194

Ryzhkova, M. N., G. N. Cherepanova, and R. L. Blekh

EARLY DIAGNOSIS OF CHRONIC MANGANESE POISONING. (*K voprosu o ranney diagnostike khronicheskoy intoksikatsii margantsom*). Tr. Akad. Med. Nauk SSSR, vol. 31, 34-43, 1954, 7 refs. Translated from Russian. 16p.

Symptoms for the early diagnosis of chronic manganese poisoning are reviewed. Functional disorders which can be discovered in the cerebral cortex in the initial stages of Mn poisoning are manifested by mental sluggishness, lack of interest, and a decrease in awareness of one's own condition. The latter should be taken into consideration in conducting periodic examinations. Symptoms of dystonia or hypotonia also appear. Disorders in the function of the motor analyzer, of its cortical part in particular, play a significant role in the developmental mechanism of motor disturbances which predominate in the pathology of this ailment in the early stages. Disturbed sleep, increased fatigability, and increased salivary secretion are also observed in the initial stages. These early stages are reversible if discovered in time. Favorable therapeutic effects are obtained in the initial stages by injections of eserine, proserine, and the intravenous administration of novocaine.

22721

APLIC NO. 41685

Sadilova, M. S., E. G. Plotko, and L. N. Yelnichnykh

NEW DATA FOR THE VALIDATION OF THE MEAN DAILY MAXIMUM PERMISSIBLE CONCENTRATION OF HYDROGEN FLUORIDE IN ATMOSPHERIC AIR. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants*. M. Y. Nuttinson (ed.), Vol. 11, Silver Spring, Md., American Institute

of Crop Ecology, 1972, p. 24-32. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 11:5-15, 1968.)

NTIS: PB 209478

The effects of hydrogen fluoride on the human organism were investigated to validate the basis for a standard maximum allowable concentration. Certain problems of the mechanism of the action of fluoride ions and the phosphorus-potassium metabolism using isotopic tracing were also studied. Two month old female rats were subjected to five-month continuous exposures to 0.10, 0.03, and 0.01 mg/cu m HF. Concentrations of 0.10 and 0.03 mg/cu m caused inhibition in the central nervous system, decreased the activity of a number of enzymes, impaired the phosphorus-calcium metabolism, and caused the accumulation of fluorine in the body and damage to the internal organs and bone tissue. The effects of the 0.01 mg/cu m were changes in the phosphorus metabolism only (inhibition of alkaline blood phosphatase and a delayed inclusion of radiophosphorus in bone tissue, liver, and blood at the end of the five-month exposure). A reduction in the mean daily maximum permissible concentration of hydrogen fluoride in the air of populated areas from 0.01 to 0.005 mg/cu m is suggested.

22722

APTIC NO. 41686

Sadilova, M. S. and E. G. Plotko

SANITARY EVALUATION OF FLUORIDES READILY SOLUBLE IN BIOLOGICAL MEDIA. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants*. M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 33-41. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 11:16-26, 1968.)

NTIS: PB 209478

The biological effects of fluoride salts, the solubility of different fluorides in biological media, and toxic thresholds of readily soluble fluorides were examined to establish a basis for a standard maximum allowable concentration. The highest solubility was displayed by sodium fluoride. Experimental data permitted the assumption that the NaF retained in the body dissolves completely in certain biological fluids. Aluminum fluoride, cryolite, and calcium fluoride will not dissolve completely in biological fluids and therefore may have a lesser toxic effect than hydrogen fluoride or NaF. Light sensitivity of the eye among subjects exposed to concentrations of 0.07 mg/cu m increased; 0.05 mg/cu m concentration affected one person only. Chronic continuous exposure of rats over the course of five months to NaF concentrations of 0.10 and 0.03 mg/cu m determined a generally toxic effect and caused the accumulation of fluorine in the bone tissue. The extent of the changes was dependent upon the NaF concentration in the air. Because of the neutral properties of NaF dust and its incomplete absorption in the body after penetration through the respiratory organs, its toxic influence is less than that of similar hydrogen fluoride concentrations. The highest single NaF concentration in the air of populated areas should not exceed 0.03 mg/cu m, and the mean daily concentration should not exceed 0.01 mg/cu m.

22723

APTIC NO. 41687

Sadilova, M. S.

BIOLOGICAL EFFECT OF POORLY SOLUBLE FLUORIDES. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants*. M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 42-47. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 11:26-32, 1968.)

NTIS: PB 209478

The biological effects of poorly soluble fluorides were studied to establish a basis for a standard maximum allowable concentration. Aluminum fluoride, a typical representative of poorly soluble fluorides, was selected for the study. The experiments were carried out with a condensation aerosol of AlF₃ at a sublimation temperature of about 700 C. An AlF₃ concentration of 0.3 mg/cu m caused a reliable increase of the light sensitivity of the eye in all the subjects. Chronic continuous exposure of two month old white female rats over the course of five months to concentrations of 0.10 and 0.03 mg/cu m established a slight but statistically reliable prolongation of the chronaxies of extensors. The heavier concentration inhibited the activity of the blood cholinesterase. On the whole, exposure to both concentrations had only a slight toxic effect. In the atmosphere the highest single maximum permissible concentration of fluorides sparingly soluble in biological media is recommended at the level of 0.2 mg/cu m, with the mean daily value at 0.03 mg/cu m.

22724

APTIC NO. 41688

Sadilova, M. S.

MATERIAL FOR STANDARDIZATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF HYDROGEN FLUORIDE IN THE AIR OF POPULATED AREAS. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants*. M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 48-60. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 10:186-201, 1967.)

NTIS: PB 209478

The influence of varying concentrations of hydrogen fluoride on human subjects and on rats was studied and threshold levels were determined to establish a basis for a standard maximum allowable concentration. For the majority of subjects, the minimum olfactory perceptible concentration was 0.03 mg/cu m. In order to determine the effect of HF on the central nervous system via the receptors of the upper respiratory tract, the change in light sensitivity of the eye of three persons with normal vision was studied and determined the threshold concentration at 0.03 mg/cu m. Chronic continuous exposure of white female rats to 0.10 and 0.03 mg/cu m HF caused a number of disturbances in the animals, including the phenomena of inhibition in the central nervous system. A 0.10 mg/cu m concentration caused irreversible destructive changes in the nerve cells; changes in the phosphorus-calcium metabolism; accumulation of fluorine in the bone system; and histopathological changes in the teeth, bone system, and viscera. The 0.03 mg/cu m concentration caused no change in the experimental animals. The highest single concentration of HF, therefore, should not exceed 0.02 mg/cu m, and the mean daily concentration should not exceed 0.01 mg/cu m.

22725

APTIC NO. 41197

Saita, G. and S. Iussana

LATE CORONARY-CEREBRAL SYNDROME OF ACUTE CARBON MONOXIDE POISONING. (*Sindrome coronaro-cerebrale tardiva da intossicazione ossicarbonica acuta*). *Med. Lavoro (Milan)*, 62(4):185-195, April 1971, 18 refs. Translated from Italian, 17p.

A 71-year old woman showed coronary changes with an electrocardiographic pattern of ischemia lesion and decreased blood pressure for 24 hr (15 days after complete recovery from coma due to acute carbon monoxide poisoning). Psychic dullness and cerebral coma followed. The patient died in spite of quick reversion to normal of the blood pressure and evident improvement of the electrocardiographic changes. The case was diagnosed as a late coronary-cerebral syndrome from acute CO poisoning. The anatomic-pathologic pattern is described with particular reference to the histologic findings of the encephalon, which showed a clear-cut prevalence of reac-

tive-inflammatory phenomena on the degenerative changes most commonly reported in similar cases. No focal lesions were found. The irreversibility of cerebral coma in spite of the transient signs of myocardial ischemia lesion and the absence of peripheral circulatory failure is emphasized. This particular course differentiated the present coronary-cerebral syndrome from those with the usual vascular pathology, where exitus occurs because of the severity of the collapse, or due to extensive focal cerebral lesions. The coronary lesion would probably not have induced such severe and irreversible cerebral changes in the absence of preexistent damage induced by acute CO poisoning. (Author abstract modified)

22726

APTIC NO. 41372

Samitz, M. H., Joseph Shrager, and Sidney Katz

STUDIES ON THE PREVENTION OF INJURIOUS EFFECTS OF CHROMATES IN INDUSTRY. *Ind. Med. Surg.*, vol. 31:427-432, Oct. 1962. 26 refs. (Presented at the American Industrial Hygiene Conference, Washington, D. C., May 17, 1962.)

The toxic properties of chromium are confined to the hexavalent compounds. The trivalent and elemental forms of chromium produce no toxic symptoms. The corrosive action of chromates is also due to the hexavalent form of chromium; trivalent chromium has no demonstrable ulcerogenic activity. Hexavalent chromium compounds are also responsible for epidermal sensitivity. There is little if any evidence that trivalent chromium compounds are able to produce allergic reactions. Since hexavalent chromium compounds are the specific responsible for systemic poisoning, skin ulcers, and allergic dermatitis, and since trivalent chromium compounds do not possess these toxic, corrosive and sensitizing properties a series of studies was undertaken based on the chemical reduction of hexavalent chromium to the trivalent form to prevent and to treat poisoning, ulceration, and allergic reactions. Ascorbic acid is an effective reducing agent for hexavalent chromium and can be used as an antidote in chromium poisoning. Ascorbic acid also inactivated patch test reactions in chromate-sensitive individuals. Another effective reducing agent for hexavalent chromium is sodium pyrosulfite. A mixture of sodium pyrosulfite, ammonium chloride, tartaric acid, and glucose was effective in the prevention of chrome ulcers in experimental animals, when used promptly following contact with chromate solutions. This antichrome mixture also showed the ability to inactivate patch test reactions in chromate sensitive individuals. Since the mixture is effective in removing hexavalent chromium from work benches, floors, towelings, and work clothing, it could be used as a decontaminating agent. (Author summary modified)

22727

APTIC NO. 41693

Sayfutdinov, M. M.

DATA FOR THE VALIDATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF AMMONIA IN ATMOSPHERIC AIR. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants.* M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 101-112. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 10:108-122, 1967.)

NTIS: PB 209478

The effect of atmospheric ammonia on the human organism was studied to establish a basis for a standard maximum allowable concentration. Air quality at major emission sources was also measured to determine existing concentrations. The threshold of olfactory perception of ammonia in the most sensitive persons was 0.5 mg/cu m, with subthreshold concentration at 0.45 mg/cu m. Light sensitivity of the eyes of two out of three subjects after short term inhalation of ammonia at a concentration of 0.45 mg/cu m decreased. In three of five sub-

jects, 0.35 mg/cu m had a substantial effect on the electrical activity of the brain. The subliminal concentration of ammonia which did not cause a change in the biopotentials of the brain, equal to 0.2 mg/cu m, is therefore, proposed as the highest single maximum permissible concentration. Continuous chronic exposure of white rats to 20 mg/cu m caused a shortening of the time of the reflex response, a depression of cholinesterase activity and oxidation-reduction function of the blood, and an increase in the excretion of coproporphyrin and ammonia in the urine. Ammonia in concentrations of 2 mg/cu m only depressed the oxidation-reduction function of the blood serum. A concentration of 0.2 mg/cu m had no effect and is recommended as the mean daily maximum permissible concentration in atmospheric air. Histopathological examinations showed no changes in the internal organs and central nervous system in animals of any of the experimental groups as compared to the control group.

22728

APTIC NO. 41368

Schlipkoeter

DETERMINATION OF LEAD IN BONE MATERIAL BY ATOMIC ABSORPTION SPECTROPHOTOMETRY. (*Blei-Bestimmung in Knochenmaterial durch Atomabsorptionsspektrophotometrie.*) Preprint, Medizinisches Inst. fuer Lufthygiene und Silikoseforschung, Duesseldorf (West Germany), 1968 (). 2 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 8p., Dec. 1971.

Lead measurements for determination of lead in bone material were conducted with an atomic absorption spectrophotometer Perkin-Elmer model 303. The photometer is equipped with a lead hollow cathode lamp, a Bowling burner, an amplifier, and an absorption recorder. The measurements were conducted at a wave length of 283 nm. With an acetylene-air mixture, zero absorption is adjusted with methyl isobutyl ketone. Each solution is atomized for 15 sec. After each second sample solution, the calibration solution is measured with a suitable lead concentration as a reference value. After determination of the extinctions, the values of the sample calibration solutions are corrected on hand of the control extinctions; and, subsequently, the mean values of duplicate and multiple measurements are established. The concentration is read on a calibration curve and recalculated with the help of the sample volume to the quantity of lead per organ. Direct atomization and measuring of the aqueous solution of the samples is in most cases not possible due to the high salt content, since deposited salts clog up atomization nozzles and burner slots. In addition, scattering effects of the particles cause an erroneous absorption signal. The treatment of the material under investigation takes place through wet ashing with nitric acid, sulfuric acid, and perchloric acid. The salts present after ashing are soluble by boiling in a high-percentage ammonium citrate solution. By means of extraction, metals can be converted and concentrated from a large volume of aqueous solution into a small volume of organic solution. Such a concentration is required because of the low lead concentrations expected. Information concerning reagents and solutions along with details on the laboratory procedure required are given at the end of the article.

22729

APTIC NO. 41131

Selikoff, Irving J., William J. Nicholson, and Arthur M. Langer

ASBESTOS AIR POLLUTION. *Arch. Environ. Health*, 25(1):1-13, July 1972. 38 refs. (Presented at the American Medical Association Research Conference on Air Pollution, New Orleans, La., Oct. 6, 1970.)

Findings of mesothelioma among individuals living in the vicinities of asbestos plants suggested that asbestos air pollution might occur. Measurements of the asbestos (crysotile) content of the ambient air in New York City and other locations were made which showed levels that ranged from 10 to 50 times 10 to the minus 9th power g/cu m. In previous stu-

died, lungs of New York residents examined at autopsy regularly showed crystalline fibrils. Occurrence of asbestos air pollution is now established. What have not yet been defined however, are the dimensions of disease hazard which may be associated. Epidemiological considerations suggest that it is improper to equate the several kinds of exposure: direct occupational, indirect occupational, exposure in family circumstances, neighborhood contamination, and general community asbestos air pollution. Since most urban air pollution is derived from commercial and industrial sources, the asbestos industry has both important responsibility and opportunity for its control. (Author abstract modified)

22730

APTIC NO. 41218

Shabad, L. M.

THE PROBLEM OF CANCER PREVENTION AND THE POSSIBILITY OF REDUCING THE CONTENT OF CARCINOGENIC HYDROCARBONS IN THE EXHAUST GASES FROM INTERNAL COMBUSTION ENGINES. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlupnymi Gazami Avtomob., Proc. Symp., 2nd, 1971. Translated from Russian. 8p.

Epidemiologic and other evidence linking air pollutants with increased lung cancer evidence is discussed. The first step in investigating the importance of many of pollutants is to determine their presence in atmospheric air, water, soil, and to establish their sources and methods of dispersal. Principal sources of carcinogenic hydrocarbons are heating systems, emissions from industrial plants, and exhaust gases from internal combustion engines. The literature shows that there is a relationship between the quantity of benzopyrene in the exhaust gases and the completeness of the combustion process, operating conditions, load, and engine adjustment. A sampling procedure has been developed where a predetermined sample of exhaust gas is passed through a cooled benzene trap, followed by spectral and fluorescent investigation. The procedure calls for a high degree of sensitivity in the analysis but recovering is significantly more complete than with conventional methods.

22731

APTIC NO. 41176

Soubrier, R., J. Nesmoz, and M. Genevois

NICKEL ALLERGY AND CUTANEOUS MYCOSES. (*Allergie au nickel et mycoses cutanees.*) Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), 27(45):720-723, 1966. Translated from French. 6p.

Four cases of dermatitis are discussed in relation to its development in persons sensitized to nickel, and the correlation which may exist between cutaneous mycoses and nickel sensitivity. The first case involves a woman who operates baths in an electrolytic nickel plating shop. Within a year eczematous lesions appeared on her hands and forearms. After the primary lesions disappeared, various allergenic symptoms appeared. It is believed that nickel sensitization triggered the appearance of these symptoms. In the other three cases, the subjects were all involved in some type of work with nickel, and all developed eczematous lesions. The initial appearance of the lesions is that of a mycotic eczema. In two observations, these lesions did not react to anti-fungal treatment. They were, however, favorably influenced by cessation of work. Tests conducted on all three subjects showed a sensitization to nickel. Analysis of these observations indicates that the influence of mycotic infection on nickel sensitization can be either to favor or modify its development. Eczematous lesions of a mycotic character, which resist anti-fungal treatment, may be caused by an industrial allergen; if so, then all contact with this allergen must be avoided.

22732

APTIC NO. 41056

Stephens, Robert J., Gustave Freeman, and Michael J. Evans

EARLY RESPONSE OF LUNGS TO LOW LEVELS OF NITROGEN DIOXIDE. Arch. Environ. Health, 24(3):160-179, March 1972. 22 refs.

A study was conducted to determine the early responses of the lungs of rats to low levels of nitrogen dioxide. Two concentrations were used, 2 ppm, approximating a realistic ambient level, and 17 ppm, approximating a higher subacute level. In animals exposed to 2 ppm NO₂, the ciliated cells of the terminal bronchiole showed loss of cilia, hypertrophy, and focal hyperplasia in the early stages of the experiment. However, after 21 days of exposure, the cilia had recovered substantially, and the appearance of the epithelium continued to improve so that it was difficult to distinguish it from normal epithelium. With the electron microscope, cytoplasmic swelling was observed in some alveolar epithelial cells. At the higher concentration of NO₂, injury to the epithelium of the terminal bronchiole was more severe and occurred much earlier. Injuries to epithelial cells lining the terminal bronchiole and adjacent alveoli were observed, together with evidence of plasma leakage into the alveolar space, as denoted by the presence of fibrin in the alveoli. Within 4 hr of exposure, type 1 epithelial cells showed isolated foci of membrane destruction, and the cells lining the terminal bronchiole had begun to change. This destructive phase of the early NO₂ lesion reached a maximum about 24 hr after the onset of exposure. This phase was followed by a period of adaptation and repair. The destroyed type 1 cells were replaced by low cuboidal cells that were able to withstand the harmful effects of NO₂. Micrographs of the effected tissues are also included.

22733

APTIC NO. 41689

Takhirov, M. T.

REFLEX EFFECT ON THE HUMAN ORGANISM OF LOW CONCENTRATIONS OF ACETIC ACID AND ACETIC ANHYDRIDE PRESENT SEPARATELY AND TOGETHER IN ATMOSPHERIC AIR. In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants. M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 61-76. Translated from Russian. (Also: Izv. Akad. Med. Nauk SSSR, vol. 11:73-91, 1968.)

NTIS: PB 209478

In order to determine the highest single maximum permissible concentration of acetic acid and acetic anhydride in the atmosphere, the threshold levels of acetic acid vapors in 30 persons were determined. The threshold of olfactory perception in the most sensitive persons was 0.60 mg/cu m for acetic acid and 0.49 mg/cu m for acetic anhydride. A concentration of 0.48 mg/cu m of acetic acid vapors caused a statistically reliable increase of the light sensitivity in two of three persons. For acetic anhydride, changes in light sensitivity of the eye in two of the subjects were noted at a concentration of 0.36 mg/cu m. The threshold of effect of acetic acid and acetic anhydride vapors on the electrical activity of the brain was also examined. Biocurrents were recorded from the temporal and occipital parts of both cerebral hemispheres of five persons with normal function of the olfactory system and distinct alpha rhythms. The threshold of electrocortical reflex was 0.29 mg/cu m for acetic acid and 0.18 mg/cu m for acetic anhydride. The proposed highest single maximum permissible concentrations are, therefore, 0.2 mg/cu m for acetic acid and 0.1 mg/cu m for acetic anhydride. During the combined action of acetic acid and acetic anhydride vapors, an effect of complete summation occurs. The threshold mixture in electroencephalographic tests consisted of 0.15 mg/cu m acetic acid and 0.087 mg/cu m acetic anhydride with a total concentration index of 0.99. When acetic acid and acetic anhydride vapors are jointly present in atmospheric air, their total con-

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centration expressed in fractions of the adopted maximum permissible concentrations of each of the substances should not exceed 1.3. 0

22734

APTIC NO. 41172

Taki, Ichiro, Sachio Hisanaga, and Yoshihiko Amagase

STUDY OF CHLORO-BIPHENYL POISONING OF PREGNANT WOMEN AND THEIR FETUSES. *Fukuoka Igaki Zasshi (Fukuoka Acta Med.)* 60(6):471-474, 1969. Translated from Japanese. 11p.

Chloro-biphenyl poisoning in nine pregnant women, who had used rice oil during pregnancy, and their fetuses was studied. The women complained of edema of the legs and arms, coloration of the nails, numbness of the legs and arms, an increase in the sticky secretion in the eyes, bloodshot eyes, eyelid edema, skin eruptions, blackening of the pores, and itchiness, which are the common symptoms of chlorobiphenyl poisoning. The characteristic grayish, dark brown staining of the skin was found in all the fetuses, two of which were stillborn. A parchment-like desquamation was observed on the skin of all live fetuses. An uneven protuberance and brown staining were observed on the gums, and the nails also showed similar staining. The coloration of the babies faded within several months after birth. These symptoms are believed to be caused by the use of rice bran oil during pregnancy. The term chlorobiphenyl poisoning neonatorum is used in describing the symptoms of the babies, in contrast to chloro biphenyl poisoning in adults. (Author abstract modified)

22735

APTIC NO. 41356

Tardivel, M., P. Brunet-Antigny, and E. Derville

NEW EXPERIMENTAL STUDIES ON THE TOXICITY OF NICKEL POWDER INTRODUCED INTO THE DIGESTIVE TRACT. ELECTROPHORETIC CHANGES IN THE RABBIT. (*Nouvelles recherches experimentales sur la toxicite de la poudre de nickel introduite par voie digestive. Modifications de l'electrophorese chez le lapin.*) *Arch. Maladies Prof. Med. Trav. Securite Sociale (Paris)*, vol. 26:263-264, April May 1966. Translated from French. 3p.

Studies were conducted on two lots of rabbits poisoned with nickel for a period of nine months. The first group consisted of 10 animals who received daily doses of 5-20 mg powdered nickel/kg body weight. The second group of 10 animals received daily doses of 100-500 mg pure nickel powder/kg body weight. Hematologic studies of the first group revealed leucocytosis with lymphocytosis, varying from 9000 to 18,000 leucocytes with an average of 60-80% lymphocytes. Hematological tests on the second group showed a normal hematocrit, quantitatively and qualitatively normal erythrocytes, and leucocytosis between 15,000 and 20,000 elements/cu mm. Electrophoretic study of the blood serum showed marked changes at the level of the electrophoretic diagram. These changes were found regularly in all of the experimental animals, and related exclusively to the distribution of globulins. The alpha 1 globulins increased appreciably, while the alpha-2 and gamma globulins diminished considerably by factors of 50-75% of their normal values. It is concluded that the hematologic and electrophoretic changes correlate with the administration of nickel; this metal can cause certain biological disturbances in the organism.

22736

APTIC NO. 41802

Tomita, K., T. Haruki, and M. Oka

EFFECTS OF AUTOMOBILE EXHAUST GAS ON RESPIRATORY FUNCTION. -- AMONG OCCUPATIONAL. (*Kokyu kino e oyobosu jidosha haigasu no eikyo -- oson shokuba kimmuth ni tsuite --*). Text in Japanese Taiki Osen Kenkyu (*J. Japan Soc. Air Pollution*), 6(1):164, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The effects of automotive exhaust gases on human respiratory function were studied on residents from main street areas, policemen on outdoor service, and other occupationally exposed persons. Breathing capacity was measured and expressed as the ratio to the standard value which was calculated on the basis of individual height and age. The subjects were divided into two groups, age under 39 and age above 40. No significant differences were found in the breathing capacities and the one second ratios between the exposed and control groups. There were also no differences between smoking and nonsmoking groups. However, lower breathing capacity and one-second ratios were found for smoking residents older than 40 years. Nine percent of persons working in polluted workshops exhibited congestion of lung function.

22737

APTIC NO. 41191

Tsuchiya, Kensaburo

CHRONIC POISONING AND OCCUPATIONAL CANCER. (*Mansei chudoku to shokuyogyo gan.*) *Sogo Igaku (Compr. Med.)*, 20(1):85-90, Jan. 1963. 7 refs. Translated from Japanese. 16p.

Careful medical and statistical observations should be made of workers who handle known and classified industrial carcinogens and that clinical and industrial physicians carefully examine the new chemical substances that are being introduced into industry to determine their carcinogenicity. Clinical and statistical methods of detecting occupational cancer are reviewed. Clinical signs for skin cancer, cancer of the bladder, and cancer of the lung and airways are presented. The occupational history is particularly important. In the statistical analysis, by comparing the relative frequency with that of the general population, it is possible to determine whether or not there is a relatively high frequency of a specific cancer in a given industry or occupation. A high value suggests the presence of some factor requiring separate and supplementary studies. In actuality, the number of reports on occupational cancer in Japan are low compared with other advanced countries, but one reason may be a failure to detect such cases.

22738

APTIC NO. 42098

Tsuchiya, Kensaburo

INFLUENCE OF LEAD ON HEALTH. (*Namari no kenko e no eikyo.*) Text in Japanese. *Kagaku (Science)*, 41(10):575-580, Oct. 1971. 13 refs

After the accumulation of lead in a human body, either through the respiratory system or the digestive system, reaches a certain point, the lead content in urine and blood increases extraordinarily, and delta aminolevulinic acid and/or coproporphyrin in blood rise exceedingly. Anemia, which can be a barometer of the degree of lead exposure, is not actually serious. More serious symptoms are severe pain in the intestinal area, which is sometimes mistaken for gall bladder stones, appendicitis, or ileus. Several drops of monocalcium disodium ethylenediamine etc. acetic acid will cure the pain. Morphine must not be used. More serious symptoms include paralysis of arms. More serious and acute cases of lead poisoning can cause encephalopathy, cases of which have been seen in babies and children who have eaten old paint or cosmetic powder in the past. The maximum allowable concentration of lead in the air has been calculated to be somewhere in the neighborhood of 0.05 mg/cu m in the past, and more recently 0.10 to 0.12 mg/cu m. However, in an actual work environment both in Japan and the United States, 0.15 mg/cu m is designated as the maximum standard. Both lead and cadmium in human body increase with the age and reach maximum at about the age 50, decreasing slightly after that. The average amount of lead that goes into the human body is approximately 300 micrograms/day. The rate of absorption is about 10%. Therefore, daily accumulation of lead in a body is about 30 micrograms, and the daily discharge through urine is 30 to 40 micrograms. The lead accumulation from other sources than through food is about 10 micrograms. However, a long term

accumulation can reach 80 to 120 micrograms in an average human body. The relationships among the accumulation quantity, discharge, absorption, half life, and time, are expressed by formulas. 0

22739

APTIC NO. 41692

Ubaydullayev, R.

DATA FOR A SANITARY ASSESSMENT OF METHANOL IN ATMOSPHERIC AIR. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants.* M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 93-100. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 10:65-74, 1967.)

NTIS: PB 209478

Threshold levels of methanol and effects on the human organism were examined to establish data for a standard maximum allowable concentration. Air around surveyed hydrolysis plants producing methanol was polluted by vapors at distances of up to 200 m. In the most sensitive persons, the threshold of olfactory perception of methanol was 4.5 mg/cu m, the threshold of reflex change of the light sensitivity of the eye was 3.35 mg/cu m, and the threshold of action of electrical activity of the brain was 1.17 mg/cu m. The highest single maximum permissible concentration of methanol, therefore, should be no higher than 1 mg/cu m. Chronic continuous exposure of white male rats to methanol at a concentration of 5.3 mg/cu m over the course of 90 days caused changes in the normal ratio of chronaxy of antagonist muscles, activity of whole blood cholinesterase, excretion of coproporphyrin with the urine, and protein fractions of the blood serum in the experimental rats. The mean daily maximum permissible concentration of methanol which can be recommended is 0.5 mg/cu m.

22740

APTIC NO. 41694

Ubaydullayev, R.

POLLUTION OF ATMOSPHERIC AIR WITH VAPORS OF HYDROLYTIC ETHYL ALCOHOL AND ITS EFFECT ON THE ORGANISM. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants.* M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 113-122. Translated from Russian. (Also: *Izv. Akad. Med. Nauk SSSR*, vol. 10:74-86, 1967.)

NTIS: PB 209478

The biological effects of exposure to hydrolytic ethyl alcohol vapors with respect to setting air quality standards were examined. The air around surveyed hydrolysis plants was slightly polluted with vapors of hydrolytic ethanol. A study of the biological effect of hydrolytic ethanol vapors established the threshold of olfactory perception in the most sensitive persons at 7.1 mg/cu m, the threshold of change of the light sensitivity of the eyes at 6.97 mg/cu m, and the threshold of the reflex activity of the cerebral cortex at 6.1 mg/cu m. The maximum inactive concentration according to the most sensitive test was 4.9 mg/cu m. The highest single maximum permissible concentration of hydrolytic ethanol, therefore, may be established at a level of 5 mg/cu m. Chronic continuous exposure of experimental rats to ethanol vapors at a concentration of 29.95 mg/cu m for 90 days caused changes in the normal ratio of the chronaxy of flexors and extensors, cholinesterase activity, excretion of coproporphyrin with the urine, and in the relative amounts of the protein fractions of the blood serum. Ethanol in concentrations of 5.59 mg/cu m did not affect the rat organism. The mean daily permissible concentration of hydrolytic ethanol in the atmosphere, therefore, may be set at the level of the highest single concentration, i.e., 5 mg/cu m.

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22741

APTIC NO. 41357

Uzawa, Haruo, Yasuo Ito, Akimitsu Notomi, and Shibanosuke Katsuki

HYPERGLYCERIDEMIA RESULTING FROM INTAKE OF RICE OIL CONTAMINATED WITH CHLORINATED BIPHENYLS. *Fukuoka Igaki Zasshi (Fukuoka Acta Med.)*, 60(6):449-454, 1969. 13 refs. Translated from Japanese. 11p.

The concentrations of the serum lipid classes were determined in 24 cases of the so-called rice oil disease, which is induced by the oral intake of rice oil contaminated with chlorinated biphenyls, known as Kaneclor. The rice oil was used as a cooking oil for several months, and the study was conducted after the cessation of intake of the contaminated rice oil. Abnormally elevated serum triglyceride levels, ranging from 200 to 600 mg, were observed in 12 of the 24 cases, while the total serum cholesterol remained unchanged and the phospholipids tended to be somewhat lowered. The results of urinalysis, liver and renal function tests, and hematological examinations were not significant. Agarose Gel electrophoresis of the serum from several patients revealed faint alpha, dense pre-beta, no tailing behind beta, and no chylomicron at the origin, indicating that the elevated triglyceride was of an endogenous origin. Preliminary animal experiments were conducted with female rabbits by the daily oral administration of 1% Kaneclor in olive oil, at the rate of 2 ml/kg body weight for 10 days. Lipemia was consistently induced within several days, reached its peak within several days after the cessation of the Kaneclor administration, and returned to the previous level several weeks after the end of the administration. Elevation of the serum triglyceride was highest in a rabbit having had a marked reduction of food intake during and after the experiment.

22742

APTIC NO. 42136

Vanhorne, M., R. Dams, J. Bressers, and C. van Peteghem

SMOKE OF THE TRIGGER PROCESS IN THE PRODUCTION OF NODULAR IRON AND ITS POSSIBLE EFFECTS ON MAN. *Int. Arch. Arbeitsmed.*, 29(2):102-118, June 1972. 38 refs.

Following complaints of foundry workers about the smoke released by the triggering process in the production of nodular iron, the composition of this smoke and its possible effects on man were investigated. Nondestructive neutron activation analysis showed 34 elements, all in concentrations below threshold limit values. The possible acute effects of this smoke on man were investigated in 10 workers. Eight workers had subjective complaints, mainly respiratory discomfort. Determination of iron in serum and lead in blood of workers before and after exposure to the smoke showed no significant differences. Clinical laboratory investigations and body temperature readings indicate that metal fume fever did not occur. All subjects showed to a different extent a decrease of vital capacity shortly after exposure to the smoke. Forced expiratory volume in one second showed no consistent changes. Long term effects of repeated short exposures are unknown.

22743

APTIC NO. 41124

Wada, Osamu

ENVIRONMENTAL POLLUTION DISEASES.

(Kogaibyō). Text in Japanese. *Shonika Rinsho (Japan. J. Pediat.)*, 25(4):35-42, April 1972. 11 refs.

The mutual relationship between an agent of disease, mankind, and various diseases is discussed by giving examples such as chronic bronchitis, pulmonary emphysema, bronchitis, and cancer of the lung which are generally called environmental pollution diseases caused by air pollution. Medical science in the future and the physician's role are discussed. The toxicity of lead, sulfur dioxide, nitrogen dioxide, and other pollutants are mentioned. The dose-response curve is described.

EFFECTS-HUMAN HEALTH

22749

22744

APTIC NO. 41153

Watanabe, M.

MORTALITY AND AIR POLLUTION IN MURORAN.

(Muroran ni okeru taiki osen to shiboritsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):60, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The middle class group of the population of Muroran city was divided into polluted and unpolluted areas. The population of Oct. 1965 was 274,895 in the polluted area and 444,250 in the unpolluted area. The upper and lower income groups were limited in number and were eliminated from the investigation. The mortality of people from both areas between 1963 and 1967 was checked and grouped by causes of death and specific cause groups. Mortalities of these groups were checked according to polluted and nonpolluted periods and correlations were studied. In all ages, both males and females had high mortality rates from respiratory diseases in the polluted area during the polluted season. However, statistically speaking, there was no significant difference. With regard to the mortality of groups between 2 and 4 years old, there was no significant difference in rate according to factors. There was a significant difference between polluted and non-polluted seasons for the female group older than 50 years of age, and this tendency was stronger for the age group older than 60. There was no significant difference among the male.

22745

APTIC NO. 41160

Watanabe, M. and N. Sukekawa

QUESTIONNAIRES ON ASTHMA AMONG YOKOHAMA S CHILDREN AND AIR POLLUTION. (Yokohama-shi yoji gakudo no zensoku anketo chosa to taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):54, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Asthmatic conditions of Yokohama's 41,854 kindergarten children were investigated by questionnaires. A total of 34,105 (81.4%) replies were obtained. The frequency of asthmatic bronchitis was extremely high and the average was 13%. The total number of bronchial asthma cases for the total of kindergarten children was 3.2%, which was higher than the percentage of school children. According to a similar questionnaire investigation that was given to 148,000 elementary school children in the fall of 1968, an increase from 1.14% to 1.54% occurred compared to the result of 1965 investigation. According to investigations by age groups, the younger the children, the more frequent cases of asthmatic bronchitis, and the actual number of bronchial asthma cases with breathing difficulty is highest among children 6 to 7 years old. Infant bronchial asthma should be separated from children's bronchial asthma, and the bronchial asthma originated as infants is much more serious than those that developed at a later date. The ratio of male and female children with asthmatic bronchitis is 2639 to 1796, or 14:1. The 1968 records of asthmatic children in large cities show that the highest rate was in Kobe, 1.68%, followed by Yokohama, 1.54%, and the lowest rate was in Nagoya, 0.70%. The frequency of children's asthma in a nonpolluted area is 0.05%, the nationwide average is 0.5 - 1.0%, and in polluted area average is 1.0 - 2.0%. In heavily polluted areas, the frequency is 2.0%.

22746

APTIC NO. 41755

Wickstrom, Gustav

ARSENIC IN THE ECOSYSTEM OF MAN. Work Environ. Health, 9(1):2-8, 1972. 43 refs.

The occurrence of arsenic in nature, as a result of industrial production, and in man, plants, and animals, is considered. The metabolism and toxicity of arsenic are reviewed. Arsenic combines readily with the sulfhydryl groups of many enzymes, and its action on the phosphatases leads to diminished oxidation and tissue respiration. Symptoms of acute and chronic

poisoning are presented. Arsenic may cause cancer of the skin. Occupational exposure to arsenic is reviewed, as well as exposure by ingestion of food, drugs, and drinking water.

22747

APTIC NO. 41067

Yamada, Shin-ya

THE USE OF METAL RESOURCES AND ENVIRONMENTAL POLLUTION-THE CONNECTION BETWEEN OCCUPATIONAL DISEASES AND POLLUTION. (Kinzoku shigen no rivo to kankyo osen-shokugyobyo to kogai no tsunagari). Text in Japanese. Kagaku (Science), 41(10):530-544, Oct. 1971. 11 refs.

Topics discussed included the historical relationship between high pollution and occupational diseases starting from the 18th century, changes in labor conditions from a high to a low-concentration exposure, the maximum permissible concentration of metal pollutants in the human body, monitoring by determining pollution sources, government anti-pollution policies, citizen awareness, an index for pollution monitoring, elimination of pollution by recovery in industrial areas, coordination of pollution monitoring within and outside of industrial areas, some pollution episodes, social attitudes toward occupational diseases, and the need for education of the public in order to eliminate occupational hazards by pollution. According to measurements made at a steel alloy factory, where lead is added to molten iron of 1500 C, 5-20 mg/cu m lead were found in the steam created immediately after the pouring of lead in the molten iron. This lasted for 5-10 min, and 0.001 to 0.01 mg/cu m concentration followed. Most of the lead is emitted to the atmosphere by suction, but the dust in the building contained 0.1-0.2% lead. An example of death by metal poisoning was the case of an old man who died of bronchial asthma after working at an iron foundry for 18 years. Autopsy showed a total lung silicosis and heavy carbon deposit in the lungs, and a long-term deterioration of lung and heart functions.

22748

APTIC NO. 41159

Yano, R., I. Hatake, and T. Nakashima

INVESTIGATIONS OF RESPIRATORY DISEASES IN POLLUTED DISTRICTS. NO. 2. CASES IN SAGANOSEKI TOWNSHIP. (Taiki osen chiku ni okeru kokyuki shoyo chosa. II. Saganoseki-cho no baai). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1): 50, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The Japan Mining Company's Copper Refinery in Saganoseki Township, Oita Prefecture has the highest stack in Japan. As a result of some complaints on the damages to citrus trees, measurements of sulfur dioxide were taken, and the maximum figure of SO₂ taken in February was 0.656 ppm, average 0.168 ppm, the maximum in March 0.557 ppm, and average 0.150 ppm. Further investigations were conducted on the health of school children by questionnaires. From the 2600 questionnaires returned by the parents, it was found that 41.5% of kindergarten children, 27% of elementary school children 15.3% of junior high school children, and 8.7% of high school students have had bronchitis. Asthma was found in 7.5% of the kindergarten children, 6.8% of elementary, 2.7% of junior high, and 2.4% of high school pupils. Tonsillitis was found in 24.5% of kindergarten children, 21.4% of elementary, 17.9% of junior high and 18.3% of high school pupils. Other symptoms such as frequent coughing, susceptibility to colds, prolonged coughing and discharge of mucous, and wheezing were found in many of the responses, but especially among the younger children. The effects of air pollution were clearly confirmed.

22749

APTIC NO. 42022

Yoshikawa, Hiroshi

INFLUENCE OF METALS ON HEALTH. (Kinzoku no kenko e no eikyo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(6): 525-534, June 1972.

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The existences of metals in humans and the effects on health are discussed. Large varieties of metals exist in the human body, from hair to bones. These metals either assist the metabolism or just remain as polluting substances. Metals such as cadmium, magnesium, lead, and arsenic accumulate in the human body and cause injuries; they mainly result from environmental pollutions. It is not necessary that metals required for the body would exhibit less toxicity. Experimental results show that mercury, followed by uranium, cadmium, indium, selenium, and copper, exhibit the strongest acute toxicity in mice, and chromium, manganese, and cobalt are less toxic. Toxic tolerances are given. The symptoms of occupational workers caused by various concentrations of certain metals are also tabulated.

22750

APTIC NO. 41598

Zarkower, Arian

ALTERATIONS IN ANTIBODY RESPONSE INDUCED BY CHRONIC INHALATION OF SO₂ AND CARBON.

(Arch. Environ. Health, 25(1):45-50, July 1972. 20 refs.)

Mice were exposed to low concentrations of carbon, sulfur dioxide, and carbon plus SO₂ in an attempt to determine the effect of chronic exposures on the immunological defense mechanism. Carbon alone or in combination with SO₂ caused a progressive decrease in overall ability of the animals to form antibodies. Reduction of antibody formation occurred in mice exposed to 2.00 ppm SO₂ for 192 days. An enhancement of antibody production occurred in mediastinal lymph nodes after 102 and 135 days of exposure, but this effect was reversed by 192 days. An unexpected enhancement of antibody production, especially in the spleen, occurred in mice exposed to SO₂ alone for 135 days. This adjuvant activity had faded by 192 days, when an overall suppression of antibody response was seen, though not to the degree observed in the animals exposed to carbon. (Author abstract)

22751

APTIC NO. 41754

Zenk, H.

OCCUPATIONAL DISEASES OF THE UPPER RESPIRATORY TRACT DUE TO CHEMICAL AGENTS. (Erkrankungen der oberen Luftwege durch chemische Schadstoffe im Arbeitsprozess). Text in German. Arbeitsmedizin Sozialmedizin Arbeitshygiene, 6(6):144-147, June 1971. 34 refs.

Occupational diseases of the upper respiratory tract due to chemical substances are reviewed. To minimize the risks of chemical substances, improved function tests (olfactometry, biochemical and histochemical investigations), epidemiological studies as well as medical and technical prophylaxis are required. The majority of the known carcinogenic substances attack the mucous membranes of the upper respiratory tract. Diseases of the upper respiratory tract in employees of the chemical industry in East Germany had a frequency of 32.3% in 1966, compared to the standard frequency of 5.5%. Chromium vapors irritate the mucous membranes of the nose, cause nose bleeding, edemas, perforation of the septum, rhinitis, and sinusitis. The latter can also be caused by mercury vapors. Highly irritating vanadium compounds may cause rhinopharyngo-bronchitis and enzymatic damages. Arsenic, the hazards of which have reduced lately, may damage the protoplasm and the capillaries, particularly when combined with sulfhydryl groups of ferments. Ammonia can be regarded as the most dangerous representative of inorganic nitrogen compounds, while its counterpart among aromatic hydrocarbons is benzene. Comparative investigations on carbon bisulfide poisoned patients are described. Anosmia due to cadmium, selenium, phosgen, vanadium compounds, carbon monoxide, sulfur dioxide, carbon bisulfide, tetrachloroethylene as well as organochlorine pesticides was determined.

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EFFECTS-PLANTS AND LIVESTOCK

22752

APTIC NO. 41541

Baumslag, Naomi and Paul Keen

TRACE ELEMENTS IN SOIL AND PLANTS AND ANTRAL CANCER. Arch. Environ. Health, 25(1):23-25, July 1972. 9 refs.

The trace metal content of plant material used for snuff was found to be closely related to the soil content. In the soil where the *Turbina oblongata* plant grew, chromium was present in a concentration of 6000 ppm. The amount of chromium in the soil samples in which the aloe and amaranthus plants grew was also raised. The nickel content of the soil in which *Turbina* grew was also high, but the zinc content of the soil in which the plant grew was low. An atomic absorption spectrophotometer was used for the determination of the trace elements. Chromium is a recognized carcinogen, particularly for the nasal Mucosa, and the evidence suggests that it may be a factor in the high incidence of antral cancer in the South African Bantu. In view of the fact that the trace elements of chromium and nickel were in the soil, a possible preventive measure would be to advise people to use ingredients for the manufacture of snuff only from plants grown in soil which is relatively free of chromium. (Author abstract modified)

22753

APTIC NO. 41361

Bergerhoff, H.

PLANT GROWTH AS AFFECTED BY SOIL TREATMENT WITH COAL DUST, FLY ASH OR IRON METALLURGY PLANT-EMITTED FLY DUST PARTICLES. (Untersuchungen ueber die Beeinflussung des Pflanzenwachstums durch Behandlung des Bodens mit Kohlenstaub, Flugasche und einem groesstenteils von Eisenhuetten und deren Nebenbetrieben in die Atmosphaere ausgestossenen Flugstaubgemisch). Text in German. Rauch Staub, 22(8):98-101, Aug. 1932. 2 refs.

Experiments on the effect of soil treatment with coal dust, fly ash, and metallurgy plant-emitted dust particles on plant growth are described. While three different doses (0.75, 1.5, and 3 kg/sq m) of these materials applied to beans in greenhouse experiments showed neither positive nor negative effect on growth of the plants, some tendencies in the variations of the crops allowed certain general conclusions. Increased doses of coal dust caused crops to increase slightly, probably as a result of the soil loosening up. Fly ash from the same coal dust, although it loosened up the soil, increased the crops only in a dose of 0.75 kg/sq m, possibly as a result of the high alkali content; larger doses showed a harmful effect. Thus, fly ash can be applied in small doses only. The dust from metallurgy plants, which had hardly any loosening effect due to its high specific gravity, affected plant growth in about the same way as fly ash. While the calcium and phosphorus contents were favorable, the presence of arsenic and cyanogenic compounds resulted in a slight decreasing of the crops. The global effect of coal dust, fly ash and metallurgy plant emissions on nearby plants may be positive, if a yearly dose of 1 kg/sq m is not exceeded, though the direct contamination of certain plants with such dusts may be a problem.

22754

APTIC NO. 41193

Blattny C. and J. Brcak

THE THREAT TO FODDER PLANTS BY SMOG AND POA ANNUA AS AN INDICATOR OF THIS SOURCE OF DAMAGE. (Die Bedrohung der Futterpflanzen durch Smog und Poa annua als Indikator dieser Schadquelle). Wiss. Z. Karl-Marx Univ. Leipzig Math.-Natur. Reihe, 11(1):111-113, 1962. 13 refs. Translated from German. 9p.

(Presented at the Symposium on Diseases and Destructive Agents of Fodder Grasses, Phytopathological Institute, East Germany.)

Poa annua plants were placed 130 cm from an automobile tunnel to detect the presence of smog. The first nine plants were removed 54 hr after exposure, an additional nine plants after 102 hr, and the last nine plants after 126 hr of continuous exposure. After 54 hr, three plants showed yellowish-white stripes across the leaf blade. The symptoms corresponded to a smog concentration of 1.5 ppm. After 102 hr, symptoms were present on all plants. After 126 hr, all nine plants showed symptoms on many leaves; almost entire leaves were white-yellow in color or exhibited stripes of light tissue running across the leaves. The sensitivity of plants to smog is dependent not only on the intensity of exposure and temperature. Decreased water consumption increases the plant resistance. The damaging effect of smog occurs even at very low concentrations; a concentration of 0.1 ppm causes destruction of the green tissues. The formation of chlorophyll and the auxin effect are retarded with concentrations as low as 0.01 ppm.

22755

APTIC NO. 41371

Daessler, H. -G.

THE ACTION OF SUPERPOWER STATION EMISSIONS ON PLANTS. (Die Wirkung der Exhale von Grosskraftwerken auf die Vegetation). Text in German. Luft. Kachetechn., vol. 6:250-252, 1967. 6 refs.

Sulfur dioxide and dust emissions for exceeding maximum allowable concentrations can be observed at distances of several kilometers from superpower stations. The degree of atmospheric contamination depends primarily on the boiler unit and on the quality of the raw brown charcoal fuel. More than 1000 tons of SO₂ are emitted daily in the Leuna-Halle-Bitterfeld-Dessau industrial area of the German Democratic Republic. Damage to coniferous forests causes enormous economic losses along with decreased vital capacity of the surviving trees and alterations of the ground flora and soil composition. Decades of dust emissions have led to alkalization of the humus layer, and coniferous areas will have to be replaced by deciduous cultures to maintain part of the forest area. Experiments performed with nitrogen and potassium fertilizers suggest that part of the coniferous areas can be saved by intense fertilizer treatment where the orographic factor is favorable. Certain genetically fume-resistant species such as Pinus nigra or Pinus peuce should be cultivated to substitute the less resistant Pinus silvestris. However, no attempts to restore a forested environment can succeed without effective control measures to decrease the industrial emissions.

22756

APTIC NO. 41439

Daessler, H. G.

THE EFFECT OF HYDROGEN FLUORIDE AND CRYOLITE DUST UPON PLANTS AND ANIMALS NEAR A HYDROGEN FLUORIDE FACTORY. Fluoride, 4(1):21-24, Jan. 1971. 3 refs. (Presented at the International Society for Fluoride Research, Annual Conference, 3rd, Vienna, Austria, March 22-25, 1970.)

Some of the findings obtained from 11 test stations situated near a hydrofluoric acid factory are reviewed. Studies were conducted on forestry, agricultural, and horticultural plantings in the emission area. In the immediate vicinity of the factory, HF induced necrotic lesions on vegetation and fluoride accumulation in the foliage of fruit trees. The leaves of fruit trees showed necroses on the side of the plants facing the factory. The margins of leafy plants reached fluoride values of up to 80 mg in dry, hot weather. At a 6 km distance, necrotic areas were found on fruit without visible damage to the foliage, particularly in pears, sweet cherries, apples, plums, and tomatoes. Fruit development decreased when HF levels were high at blossoming time. Only the fruit of pears is sensitive; the leaves and fruit of plums are equally susceptible to damage. Resistant plants include sour cherries, winter rape, sugar beets,

potatoes, cabbage, asters, and roses. Results of fumigation experiments showed that although most evergreens, walnut, and maple trees should not be considered for cultivation near fluoride pollution, field corn, common oak, and lilac can be planted. Forage near the factory contained 76-120 mg fluoride/100. This caused reduced milk production, yellow stains on teeth, motor disorders, and bone changes in dairy cows. Bee populations were also affected. A decrease in fluoride pollution was accomplished by the installation of control equipment.

22757

APTIC NO. 41717

Duling, Frank Fraser

PROBLEMS OF POLLUTION. III. LAND POLLUTION. J. Roy. Soc. Arts (London), vol. 119:520-527, July 1971. 7 refs. (Presented at the Royal Society of Arts, London, England, March 29, 1971.)

Many soils are showing adverse effects as a result of pesticides and over cultivation. They are often greasy and are showing much more lateral run-off of water which carries some of the surplus mineral fertilizers into the river systems. The intricate buffer of humus is at a low ebb. The soil is no longer the sponge it was—a sponge which not only holds water for the crop, but also influences invertebrate soil fauna and their behavior in the presence of organochlorine pesticides. Fungicidal sprays and organo-metallic seed dressings do not seem to concentrate in food chains, their use can, however, reach dangerous levels in such intensive culture as orchard row. It is too early to state definitely the effects of airborne mercury on soils because of the considerable natural mercurial content of most soils. Industrial soil pollution by copper, zinc, and lead has occurred often in the past, but is unlikely to become important in England in the future. Nevertheless, old polluted sites are persistent and in need of reclamation. Soil damage can result from an excess of nutrient organic matter in the form of farm-produced excreta and sewage sludge. Sometimes it is spread too heavily, and as pig manure is often in the form of slurry, there can be anaerobic sealing of the soil. The effects of radioactive pollutants and the dumping of solid wastes are discussed briefly.

22758

APTIC NO. 41551

Dobrovolsky, I. A. and E. A. Strikha

RISE OF PLANT GAS-RESISTANCE UNDER THE EFFECT OF TRACE ELEMENTS. (Pidvyshchennya gazostiykosti roslin pid vplyvom mikroelementiv). Text in Ukrainian. Ukr. Bot. Zh., 28(6):698-702, 1971. 14 refs.

The influence of manganese, cobalt, and strontium on the development of plants around industries with highly polluted atmospheres was studied. A presowing treatment of radish seeds with 0.1, 0.5, and 0.005% of manganese sulfate, cobaltous nitrate, and strontium nitrate, respectively, increased the seedling growth by 39%, growth of roots by 78%, weight of individual seedlings by 50%, and activity of catalase by 53% in the case of manganese; by 20, 78, 35, and 40%, respectively, in the case of cobalt; and by 60, 140, 65, and 70%, respectively, in the case of strontium. Almost identical results were obtained with ryegrass. In both cases the water retention ability of the cells increased. Laboratory and field experiments showed that the trace elements increased the resistance of plants against industrial pollutants, especially against sulfur oxides and hydrogen sulfide.

22759

APTIC NO. 41705

Dybezynska, Krystyna

EFFECTS OF NITROGEN COMPOUND EMISSIONS FROM A NITROGEN FERTILIZER MANUFACTURING PLANT ON THE ENVIRONMENT. (En godsel-medelsindustris kväveföroreningar). Text in Swedish. Kem. Tidskr., no. 3:30-32, 1972.

Forest damages caused by nitrogen compound (ammonium nitrate dust and nitrogen oxides) emissions from a nitrogen fertilizer manufacturing plant in Pulawy (Poland) are described. The yearly plant output of nitrogen is 700,000 tons. The chief pollutants, in annual amounts, are ammonia (over 2000 tons), NO_x (about 4000 tons, expressed as nitrogen pentoxide), ammonium nitrate dust (about 6000 tons), urea dust (about 2000 tons), small quantities of hydrogen, nitrogen, methane, hydrogen sulfide, and carbon monoxide, 30,000 tons of sulfur dioxide, and about 17,000 tons of fly ash from the power plant. Although the total annual deposit is below the limit value with less than 250 tons/sq km, i.e., 2.2-7.0 t/sq km of sulfates, 1.2-24.4 t/sq km of ammonia and 0.3-20.0 t/sq km of nitrate, the forests, chiefly conifers, surrounding the plant are seriously damaged. The maximum nitrogen oxides concentration is 0.6 mg/cu m. Three different zones of damage around the plant are distinguished: total damage within a radius of about 2 km, serious damages within about 4 km, and partial damages within 15 km. A forest area of 1000 hectare, where a minimum deposit of 0.8 t/sq km/yr was measured, sustained damages of 30-70%, while a minimum of 1.1 t/sq km/yr in another area caused more than 70% damage. The aerosols caused plasmolysis on leaves and other parts of the plants; the damages were due to the toxic effect on the assimilation apparatus rather than to the increased nitrate transfer. The recultivation of the damaged forest was not possible, but a certain equilibrium was maintained by means of definite crops.

22760

APTIC NO. 42038

Fock, H., D. T. Canvin, and B. R. Grant

EFFECTS OF OXYGEN AND CARBON DIOXIDE ON PHOTOSYNTHETIC O_2 EVOLUTION AND CO_2 UPTAKE IN SUNFLOWER AND CHLORELLA.

Photosynthetica, 5(4):389-394, 1971. 21 refs

Using an open system, the photosynthetic oxygen and carbon dioxide gas exchange of sunflower and *Chlorella* were measured from 0 to 5000 vpm CO_2 . At low concentrations oxygen, the ratio CO_2/O_2 is independent of the applied CO_2 tension and the value is always close to unity. At both 21% and 44% O_2 the uptake of CO_2 is much greater than the evolution of oxygen. Consequently, the resultant CO_2/O_2 ratios are variable and depend on the O_2 and CO_2 partial pressures in the atmosphere surrounding the biological material. At saturating CO_2 concentrations, the CO_2/O_2 ratios reach minimal values which are significantly higher than one. To relate the changes in CO_2 uptake and O_2 evolution to metabolic changes the distribution of radioactive carbon in four water soluble fractions was investigated in a kinetic $^{14}\text{CO}_2$ fixation experiment with sunflower. At 400 vpm CO_2 and 1% O_2 less radiocarbon was found in the basic (mainly amino acids) and weakly acidic fractions (mainly organic acids) than 400 vpm CO_2 and 21% O_2 . In the corresponding neutral (predominantly carbohydrates) and strongly acidic fractions (predominantly phosphate esters) there was no apparent difference in ^{14}C label. Hence, the intermediate products of photosynthesis depend upon the composition of the gas supplied to the plant. It appears that secondary oxidations take place at high concentrations of oxygen which use as substrates not only recent photosynthate, but also reserve material and which do not all result in CO_2 evolution. (Author abstract modified) 0

22761

APTIC NO. 41362

Haut, H. van

THE ACTION OF AIR POLLUTANTS ON PLANTS.

(*Wirkungen von Luftverunreinigungen auf Pflanzen*). Text in German. In: *Ullmanns Encyklopaedie der Technischen Chemie*. Vol. 2/2. 3rd ed., Berlin, Urban and Schwarzenberg, 1968, p. 349-356. 9 refs.

Sulfur dioxide and hydrogen fluoride are the main industrial pollutants causing widespread damage to plants; nitrogen oxides, ammonia, hydrogen sulfide, chlorine or hydrochloric

acid, bromine, and iodine produce effects limited to the industrial area. Hydrophile mineral acid vapors such as sulfuric or nitric acid exhibit their action within the area close to the emission source. Depending on the concentration of pollutants and on the duration of their action, plant damage can be acute, chronic, or latent. Acute damage is produced by high air pollutant concentration following short-time exposure; leaf necrosis, general weakening of plant vitality, reduced growth, and sometimes plant death are its main effects. Chronic plant damage occurs in areas exposed to long lasting low pollutant concentrations and includes chloroplast damage associated with inhibition of photosynthesis and overall impairment of metabolism. Latent damage is considered a precursor of chronic damage. Alterations of the structure, pH, and nutritional quality of soil from the cumulative action of pollutants cause indirect damage to plants. Diagnosis of plant damage from air pollutants can be made visually, by chemical analysis of air and plant samples, and by biological tests. Experimental evaluation of pollutant action on plants in special exposure chambers or in the free field should constitute one of the basic tools of research in this field. Included are descriptions of such experimental facilities are described and prevention of plant damage from pollutants by special soil treatments is discussed.

22762

APTIC NO. 42173

Hope, H. J. and L. Ordin

METABOLISM OF 3-INDOLEACETIC ACID IN TOBACCO EXPOSED TO THE AIR POLLUTANT PEROXYACETYL NITRATE. *Plant Cell Physiology* (Tokyo), 12(6):859-857, 1971. 17 refs.

In a study of the possible effects of the air pollutant, peroxyacetyl nitrate (PAN), indole-3-acetic acid-2-(^{14}C) (IAA-2-(^{14}C)) was administered immediately before or after gassing with PAN. PAN-treated plants which metabolized in light and had partially damaged leaves contained more unmetabolized IAA in the leaves than control plants. Several suspected indole conjugates from leaves of PAN-treated plants contained relatively less label than the controls. Plants which metabolized in the dark and showed no visible external damage also exhibited changes in IAA metabolism. These changes, however, were qualitatively different from those observed in damaged tissue. The chemical nature of the IAA metabolites produced under the experimental conditions used was not elucidated. Oxindole-3-carbinol was not found. This and other evidence led to the conclusion that oxindoles probably were not produced during or after the PAN treatment. In a study of enzymes associated with cell-wall biosynthesis in tobacco leaf, plants treated with PAN and then analyzed within one hour showed a relative decrease in glucan synthetase activity, appearing well before the appearance of visible leaf damage, which required four to five hours. Whether the slight changes in IAA metabolism reported were directly related to the PAN effect on glucan synthetase activity is not known, but evidently plants which showed no visible damage may have experienced biochemical damage as a result of exposure to air pollutants. Such biochemical damage may be partly responsible for the increased leaf drop and reduced plant vigor and fruit yield observed in crops subjected to air pollutants.

22763

APTIC NO. 41718

Inden, Tokutaro, and Shoji Tachibana

INJURY TO CROPS BY GAS AS PRODUCED FROM PLASTIC MATERIALS. (*Purasuchikku shizai yori hassei suru gasu ni yoru sakubutsu no higai ni tsuite*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan Soc. Air Pollution), 6(1):171, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The effects of gas formations of phthalate and epoxy plasticizers on crops were studied at room temperature and 100 to 200 C. The materials were tested either alone or as

products including polyvinyl chloride and a stabilizer. At room temperature, dioctyl phthalate (DOP) did not injure the cucumber leaves, whereas diisobutyl phthalate (DIBP) injured 74.1%, and dibutyl phthalate (DBP) injured 36.5% of the surface of the leaves. Among many stabilizers tested, triphenyl phosphite injured 80% of the surface area of cucumber leaves. At 100 C to 200 C for 48 hours DIBP and CLP injured the Chinese cabbage leaves most, about 80% of the surface area. The following chemicals for the manufacturing of the plasticizers were also found to injure Chinese cabbage leaves, isobutanol 18.3%, 2-ethyl-hexanol 98.3%, isodecanol 98.5%, phthalic acid 40.0, and adipic acid 6.6%.

22764

APTIC NO. 41529

Iman, R. E. and R. B. Ingersoll

NOTE ON THE UPTAKE OF CARBON MONOXIDE BY SOIL FUNGI. *J. Air Pollution Control Assoc.*, 21(10):646-647, Oct. 1971. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 1971, Paper 71-65.)

When the chemical and photochemical reactions known to transform carbon monoxide in the atmosphere were recognized as being too slow to account for the disappearance of the quantities of CO in question, first green plants and then soil were investigated as possible sinks for CO. None of the green plants tested demonstrated any tendency to take CO out of the atmosphere, nor did sterile soils. Potting soil, however, had a distinct capacity for CO uptake, and a series of tests strongly indicated that the uptake of CO was mediated by a biological rather than a physical mechanism. When isolations of microorganisms were made from three of the soils collected in California, of the 200-plus cultures tested, 16 proved capable of removing atmospheric CO. All were fungi.

22765

APTIC NO. 41363

Keller, Th. and E. Bovay

PLANT DAMAGES DUE TO SULFUR DIOXIDE IMMIS-SIONS. (*Pflanzenschadigungen durch Schwefeldioxyd-Immissionen*). Text in German. *Bull. Eidgenoess. Gesundheitsamtes, Beilage B*, no. 4:48-56, 1966. 13 refs.

Sulfur dioxide causes damage to plants by disrupting assimilation processes and enzyme systems. Chlorophyll is attacked, and the closing mechanism of the respiratory openings of the leaves is paralyzed. Both crops and nutritive values of farm plants decrease, and resistivity and vitality are impaired. Plants can detoxify SO₂ by oxidizing it to sulfate. Thus, the different resistivities of certain species and individual plants in different periods of the year can be explained by their different degrees of SO₂ absorption and detoxication, and by their assimilation activity. Increased doses of nitrogen and potassium are useful in agriculture. Coniferous trees, the most sensitive to SO₂ suffer losses in growth rate, resistivity, and vitality as secondary effects. Farm plants show different degrees of resistivity at different stages of development; thus, in cereals, the critical stages are those of trefoil and generative growth. Sugar, starch and protein reserves are decreased due to disturbed assimilation. Sulfur dioxide damage can be evaluated by symptomatology (coloration and premature leaf drop) and lead analysis. A special nephelometric test has been developed for pine needles. Measurements of assimilation, transpiration, and growth rate, however, both are complicated and time-consuming. In comparative tests, two plants are cultivated under identical conditions one in an atmosphere without SO₂.

22766

APTIC NO. 41142

Leben, C. and H. B. Kriebel

AIR POLLUTION DAMAGES OHIO PINES. *Ohio Rep.*, vol. 55:66-68, Aug. 1970.

A number of diseases affecting white pines are caused by air pollutants. A disease known as chlorotic dwarf is particularly

troublesome because it is so evident and harmful to afflicted white pines. This disease is best observed in 10-15 year old trees. In a polluted region, 5-30% of the trees of a single planting may be reduced in height, have stunted roots, and mottled needles. Air pollutants damage white pines by harming the needles, where nutrients are produced. The capacity for nutrient production is thus reduced, affecting needles during the growing season. The next spring, the plant begins the season with fewer reserve nutrients, which results in dwarfing. The chlorotic dwarf condition is an advanced stage of air pollution damage. It occurs when sensitive trees are exposed to pollutants year after year. The three main gaseous pollutants affecting plants are sulfur dioxide, ozone, and peroxyacetyl nitrate. The best long-term control method would be to plant white pines known to be genetically resistant to damage by air pollutants. The discovery that some white pines are sensitive to air pollutants has resulted in the realization that levels of polluted air that may be harmful to plants are much more widespread than previously suspected.

22767

APTIC NO. 41361

Lewis, E. F., and J. C. Meikle

NOTES ON THE USE OF CALCIUM DISODIUM VERSENATE IN HEAVY METAL POISONING OF LIVESTOCK. *Brit. Vet. J.*, vol. 114:69-71, 1958. 10 refs.

The phenomenon of chelation and its application to heavy metal poisoning of livestock are reviewed with respect to the pharmacology, clinical applications, and method of administration. Calcium disodium versenate (Ca-EDTA) shows chelate value in the treatment of lead poisoning and acute copper poisoning. The chelate combines in the body with metals capable of displacing calcium while the normal body content of the same metals is unaffected since the latter are already part of more stable complexes. Administration of Ca-EDTA should not produce anemia or derangement of B12 metabolism. A dose rate of 1 g for every 40 lb of body weight provides adequate chelation. Unabsorbed lead in alimentary system is rendered inert by oral doses. Normal administration is given intravenously at a final dilution of normal saline or glucosaline of 5%. Initial treatment should be followed by a second dose after several days interval.

22768

APTIC NO. 41128

Maddowall, F. D. H. and A. F. W. Cole

THRESHOLD AND SYNERGISTIC DAMAGE TO TOBACCO BY OZONE AND SULFUR DIOXIDE. *Atmos. Environ.*, vol. 5:553-559, July 1971. 7 refs.

Fumigation of greenhouse grown tobacco with ozone corroborated the approximate threshold dose of 20 ppb/hour as observed in the field. Synergism between O₃ and sulfur dioxide was confirmed but it was not obtained with SO₂ at a dose an order of magnitude less than the O₃ threshold dose as they occurred in the field. Synergism did not lower the threshold dose of O₃. The synergistic mixtures were twice as potent as the added effects of the components. (Author abstract)

22769

APTIC NO. 41800

Maeno, M.

EFFECT OF AIR POLLUTION ON TREES (VIII). HEAVY METALS IN LEAVES OF STREET TREES. LEAD, NICKEL, CHROME, AND CADMIUM. (*Jumoku ni taisuru taiki oken no eikyo (Dai hachi ho). Gairo nyo no jukinzoku nikkeru, nameri, kurumu, kadomumu*). Text in Japanese. Taiki Oken Kenkyu (J. Japan Soc. Air Pollution), 6(1):159, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The nickel, lead, chromium and cadmium contents of leaves of plants grown in Tokyo area were measured. The nickel content ranged from 7-15 ppm, the lead content from 14-34 ppm, chromium from 4-16 ppm, and cadmium from 0.7-1.3 ppm.

Fluctuations in metal contents were most pronounced for paulownia. High contents of nickel, lead, and chromium were found in highly polluted industrial areas of the three elements, the difference in lead content in industrial areas compared to that in residential and commercial areas was less significant. This was attributed to the contribution of lead in exhaust gases. Correlation coefficients between metal content and insoluble materials adhering to leaves were calculated for individual plants.

22770

APTIC NO. 41904

Maeno, M.

EFFECTS OF AIR POLLUTION ON TREES (IX) FLUORINE IN LEAVES OF STREET TREE. (*Jumoku ni taisuru taiki osen no eikyo (Daikyuho) Gairo juyo no fusso kanryo*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):154, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

The fluoride contents of street trees in various areas were studied. Fluorides were mainly discharged as hydrogen fluoride and silicon tetrafluoride. The tolerance threshold of plants to fluorides was as low as 1-10% of tolerance to sulfur dioxide. Fluoride content in leaves of paulownia sampled in May 1967 was highest value at 1600 ppm and averaged at 409 ppm. The average concentration in leaves of the maidenhair tree was 193 ppm; that of the willow was 97 ppm. Average concentrations in leaves of trees in commercial and residential areas were as low as 10-30% of concentrations in industrial areas. Fluoride concentration slightly increased in the residential area from 1967 to 1970 but remained unchanged in commercial areas and decreased in industrial areas. High fluoride content was also measured in the soil of industrial areas.

22771

APTIC NO. 41983

Maeno, Michio

ATMOSPHERIC POLLUTION AND BOTANICAL GROUP GROWING. (*Taikiosen to Shokubutsu Gunraku*). Text in Japanese. Kankochō Kogaisenmon Shiryō Public Nuisance Gaz., no. 3:58-64, April 1972.

A botanical index for the evaluation of atmospheric pollution is examined. Plants can be affected by sulfur dioxide, fluorides, chlorine, nitrogen oxides, ozone, hydrogen sulfide, ethylene, dust, and peroxyacetyl nitrate. Type of damage in plants depends on the difference in pollutants. The Science and Technology Agency has investigated four kinds of deciduous trees and five kinds of evergreens. The period of the investigation was from last part of July to last part of August, and for the investigation of defoliation, after the first part of October. Surveyed areas were six spots 2, 4, and 6 km to the west, 12 km to the west northwest, and 12 and 25 km to the northwest of the seaboard industrial belt area. The relationship between distance from the industrial belt area and degree of damage is given. The relationship between concentration of sulfur oxides in the air according to the lead dioxide method and sulfur content in ginkgo leaves is a close correlative relationship. Use of the botanical index for evaluation of atmospheric pollution has a bright future, and in order to get the widely spread information, it is necessary to patternize and computerize the subjects of investigation. The specific gravity of each of the investigation items should be compared with the comprehensive plant vitality.

22772

APTIC NO. 41729

Manning, W. J., W. A. Feder, P. M. Papia, and I. Perkins

INFLUENCE OF FOLIAR OZONE INJURY ON ROOT DEVELOPMENT AND ROOT SURFACE FUNGI OF PINTO BEAN PLANTS. *Environ. Pollut.*, vol. 1:305-312, April 1971. 23 refs.

Chronic exposure of Pinto bean plants to levels of ozone sufficient to cause foliar injury adversely affected shoot and root

growth and vigor and enhanced senescence. These effects were reflected in quantitative rather than qualitative differences in the successional root surface fungi. More fungal colonies were consistently isolated from roots and hypocotyls of plants exposed to O₃ than from those grown in charcoal filtered air. Roots and hypocotyls of plants exposed and not exposed to O₃ were colonized by the same fungi and each had the same general mycoflora at each sampling period. Rhizobium nodules were found on the roots of plants grown in charcoal filtered air, but were not found on the roots of plants grown in the O₃ chamber. (Author abstract)

22773

APTIC NO. 42121

Nakajima, Yasuhiro, Sachihiro Hagiwara, and Seiji Ogawa

EXPERIMENTATION OF RELATION BETWEEN TREES AND DUST. (*Jumoku to jinai ni kansuru shiken*). Text in Japanese. Ringyo Shikensho Jiho (Bull. Fukuoka-ken Forest Exp. Station), no. 22:31-35, March 1972.

In order to clarify the effect of dust on trees, 11 kinds of infant trees were planted in April 1969 on a seedplot in the Forest Experiment Station. Fly ash (pH 6.5) and cement dust (pH 11.6) were used. Every 10 days, 1/3 of 20 g/sq m/mo and 70 g/sq m/mo were sprayed on the plants. The period for spraying was 17 mo from July 1969 to Dec. 1970. In order to see the effect of treatment with dust on growth of trees, the growth index was determined. Also, changes in soil pH caused by treatment with dust were measured. However, the result of this experiment revealed no visible symptoms of damage caused by the treatment with dust. One of the reasons was that this experiment was conducted under conditions fairly different from actual atmospheric conditions polluted, in which the dust is constantly affecting the trees. Also, the dust causing change in soil, was pointed out.

22774

APTIC NO. 42086

Nakashima, Yasuhiro, Yukihiro Hagihara, and Seiji Ogawa

NOTES ON THE DUST DAMAGE OF TREE. (*Jumoku to jinai ni kansuru shiken*). Text in Japanese. Fukuoka-ken Ringyo Shikensho Jiho, (Bull. Fukuoka-ken Forest Exp. Station), no. 22:31-35, March 1972. 1 ref.

Sulfur dioxide, chlorine, and fluorine affect trees. Eleven kinds of young trees were planted in April 1969. The fly ash and cement dust were spread three times/month through 17 months on the trees of the test groups which were compared with the trees of control groups. There was no visible negative effect of the ash and the dust on the development of trees. The developmental index for each kind of the tree was measured and is shown on a graph. The pH of the soil of each group was measured and is shown on a table.

22775

APTIC NO. 41482

Pfeffer, Anton

INSECT PESTS ON FIRS IN AIR POLLUTION AREAS.

(*Insektenschaedlinge an Tannen im Bereich der Gasexhalationen*). Z. Angew. Entomol., vol. 51:203-207, 1962/1963. 9 refs. Translated from German. Scientific Translation Service, Inc., Santa Barbara, Calif. 7p.

The effect of fluorine emitted into the air on insect pests in fir groves was investigated in center Czechoslovakia. Before the first signs of injuries, an attack of dark beetles often appeared along with occasional snout beetles. Weak damage from the larvae of the fir leaf roller could also be observed. The fir bark lice appeared only in isolated instances. In the course of several years, the fir trees slowly sickened and died. Primary monophagous bark beetles of the genus Pityokteines Fuchs disappeared. Only small numbers of Pissodes piceae Ill. and the bark beetle species living in twigs (Cryphalus piceae Rtz., Cryphalus abietis Rtz., and Pityophthorus pityographus Rtz.) were observed. In contrast, Dreyfusia piceae Rtz., Dreyfusia nusslii C.B., and the polyphagous wood wasp living in the wood (Paururus juvencus L.) increased in population. (Author summary modified)

22776

APTIC NO. 41189

Piskornik, Zdzislaw and Stefan Godzik

EFFECT OF AIR POLLUTION ON PLANTS. (*Oddziaływanie zanieczyszczeń powietrza na rośliny*). Text in Polish. *Wiad. Bot.*, 14(2):91-102, 1970. 157 refs.

Some aspects of sensitivity of plants of phytotoxic agents (sulfur dioxide, fluorine and chlorine compounds, ozone, pollutants of an oxidative character) and of the changes in intensity of vital plant processes are discussed. Discussion is based on literature documentation. The role of ecological factors (atmospheric and soil humidity, sun-light conditions, temperature, and content of minerals in soil) in modification of susceptibility of plants to phytotoxic pollution of the atmosphere and in modification of effect of these pollutants on biological processes in plants is shown. The age of foliage also modifies in plant sensitivity to pollution with foliage on middle age being most sensitive. Some gaseous phytotoxic compounds accumulate in leaf cells (SO₂, fluorine and chlorine compounds). The changes in intensity of plant physiological processes, especially in photosynthesis, are a measurable and sensitive indicator of plant reaction of pollution. The disturbances in enzymatic processes, i.e., changes in activity of a number of enzymes caused by SO₂, ozone, fluorine compounds, and substances of photochemical origin, are discussed.

22777

APTIC NO. 41358

Podzorov, N. V.

PHOTOSYNTHESIS AND RESPIRATION OF PINE TREES DEPENDENT ON THE DEGREE OF AIR POLLUTION. (*Fotosintez i dykhaniye sosny v zavisimosti ot stepeni zagryazneniya atmosferynoy vozdukh*). Text in Russian. *Tr. Gl. Geofiz. Observ. Im. A. I. Voikova*, no. 238:232-235, 1969. 3 refs.

The harmful effects on pine trees of flue gases from industrial plants were investigated. The intensity of basic physiological processes in pine trees (photosynthesis and respiration) was measured in relation to the extent of damage from industrial emissions; to sulfur dioxide concentrations in the atmosphere; and to the distance from the source of pollution. Colorimetric methods were employed. Trees with maximum damage (more than two thirds of the tree was dry) had five times fewer needles than undamaged ones, and the surface area of their needles was smaller. The intensity of photosynthesis and respiration increased with distance from the pollution source, and was considerably lower for severely damaged trees. Thus the presence of SO₂ in the atmosphere disturbs basic physiological functions of the pine tree. Sulfur dioxide concentrations 0.23-0.32 mg/cu m causes a rapid disturbance in photosynthesis which results in the drying of trees within 2-3 yrs. Concentrations of 0.23-0.08 mg/cu m lead to slow drying in 5-7 yrs as a result of the decrease in photosynthesis intensity. 0

22778

APTIC NO. 41369

Pollanschuetz, J.

METHOD FOR SMOKE DAMAGE DETERMINATION AS IT IS PRESENTLY APPLIED BY THE FEDERAL FORESTRY RESEARCH INSTITUTE. (*Methodik der Rauchschadensfeststellung, wie sie gegenwaertig von der Forstlichen Bundesversuchsanstalt angewandt wird*). Text in German. *Mitt. Forst. Bundesvers.*, no. 73:81-89, 1966. 1 ref. (Presented at the Symposium on Smoke Damage to Forests in Austria, Vienna, Austria, Nov. 9-11, 1965.)

In the case of suspected smoke damage, needle and soil samples are analyzed, and the proper investigations are performed to determine chronic emission. Both diagnosis and damage calculations should be based on a series of consistent phenomena instead of on isolated symptoms and findings. The results of visual inspection only indicate possible smoke damage. As a first step, orographic conditions, character, direction, speed, and daily distribution of air movements are investigated. The test points are marked depending on the dominant wind

direction, with special regard to the suspected pollution source, or the prevailing pollutant. In choosing the test points, the comparability of the test stands is of great importance, particularly in the case of chronic emissions. In the second step of the investigation, air and needle analyses and growth measurements are carried out, with emphasis on radial growth measurements. All investigations should be centered on determining the economic damages and consequences instead of on physiologic effects of the emission; physiological damages do not necessarily imply economic losses.

22779

APTIC NO. 41143

Smith, William H.

LEAD AND MERCURY BURDEN OF URBAN WOODY PLANTS. *Science*, 176(4040):1237-1239, June 16, 1972. 30 refs.

Branch samples were collected from Sept.-Nov. 1970 throughout the city of New Haven, Connecticut. The species surveyed were pin oak, sugar maple, Norway maple, eastern hemlock, yew, and Norway spruce. Portions of the samples collected for lead analysis were subjected to various washing procedures. All samples were then dried and ashed. The lead content was determined by atomic absorption spectrophotometry. Mercury determinations were made with unwashed specimens by means of a flameless adaptation of atomic absorption spectrophotometry after wet digestion. The average values exceeded most lead concentrations reported for trees, and the maximum values, exceeded all previously reported lead concentrations, even for trees in areas with geologic lead deposits. The highest lead concentrations were associated with twigs in sugar maple, eastern hemlock, yew, and Norway spruce and with leaves in pin oak and Norway maple. The maximum lead concentration observed was 760 ppm in a washed hemlock twig. Washing procedures did not appear to affect the lead amounts. Also, ten unwashed samples of tree and shrub tissues collected in New Haven during the same period were analyzed for mercury. The mercury content of six of these samples slightly exceeded 0.5 ppm. Only one sample contained more than 1.0 ppm mercury. Woody plants may play an important role in heavy metal cycling in urban areas by acting as a short and long term repository

22780

APTIC NO. 41364

Stefan, K. and J. Pollanschuetz

FORMATION AND DEVELOPMENT OF SMOKE DAMAGE IN THE NEIGHBORHOOD OF MAGNESITE FACTORY. (*Entstehung und Entwicklung eines Rauchschadengebietes in der Umgebung eines Magnesitwerkes*). Text in German. *Allg. Forstz.*, no. 78:51-54, 1967. 12 refs.

Systematic investigations of the effects of a magnesite factory on nearby forests are described. Needle and leaf analyses, measurements of dust build-up, and radial and vertical growth rates were carried out in different points over a period of four years. In 1959, the daily sulfuric acid emissions ranged from 0.06 to 0.25 mg, while the yearly averages for the period of 1961-1964 were 0.56; 0.95; 1.15, and 0.60 mg/day. The yearly maxima were 1.2; 2.1; 2.8 and 1.4 mg/day. The points of maximum emissions were southeast of the plant. For the same period, the yearly averages of the sulfur content in the needles were 292, 310, 339, and 170 mg % H₂SO₄; areas northwest of the plant gave the highest values. Dust emissions were higher in southeast than in northwest areas. A maximum of 0.08 g/sq m day occurred in 12 measurements. Growth measurements revealed chronic damage with persistently reduced rates of growth. The different rates of growth were affected by wind direction. As uniform SO₂ concentrations and highly different dust concentrations resulted in the same degree of growth retardation, the negative effect of magnesite dust was regarded as unimportant. Firs were the least affected of all trees. As opposed to coniferous trees, the rate of growth of beeches increased considerably in the emission-affected area. This may

be explained from the possible fertilizing effect of magnesium sulfate on the leaves.

22781

APTIC NO. 41370

Stefan, K.

THE VALUE OF AIR AND NEEDLE ANALYSES FOR SMOKE DAMAGE DETERMINATION. (*Der Wert von Luft- und Nadelanalysen fuer die Rauchschaedensfeststellung*). Text in German. Mitt. Forst. Bundesvers., no. 73:91-99, 1966. 9 refs. (Presented at the Symposium on Smoke Damage to Forests in Austria, Vienna, Austria, Nov. 9-11, 1965.)

For air analyses, quantitative and qualitative long-term methods, rapid methods, continuous and intermittent, and recording methods can be applied. Qualitative long-term analysis does not reveal the actual time the emission occurred and the frequency of toxic concentrations. The rapid and recording methods deliver data on the absolute concentration and the frequency of toxic concentrations. The latter methods should, however, be preceded by a general survey, applying long-term methods. Formulae for determining stack height only apply to plain areas with no forests. Threshold values cannot be regarded as fully reliable. The threshold of 0.5 mg/cu m for sulfur dioxide may be too high for certain plants. For sulfur dioxide, leaf analyses are not fully reliable due to the inherent SO₂ content and the lack of a direct relationship between emission intensity and leaf SO₂. Fluorine analyses yield, however, unambiguous results. The samplings should be completed within a relatively short period, and in the same vegetation periods for analysis extending over a number of years. Due to different sensitivities and influencing factors, the intensity of the damage cannot be determined from SO₂ and fluorine analyses. Consequently, representative forest age and comparable test areas are principal sampling criteria. While air and needle analyses unambiguously reveal the fact of emission, the actual damage can only be determined from growth measurements.

22782

APTIC NO. 41952

Tanaka, Hirofumi, Toshiharu Takanashi, and Michihiko Yatazawa

EXPERIMENTAL STUDIES ON SO₂ INJURIES IN HIGHER PLANTS (PART 5). (*Aryusan gasu ni yoru shokubutsu higai no jikkenteiki kenkyu (Dai 5 ho) Tansan kotei ni taisuru aryusan ion no eikyo*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1): 143, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

Sodium bicarbonate-C-14 and sodium ribulose-1,5-2-phosphate were placed in a small test tube and allowed to react with alfalfa leaves, cultured in Arnon culture solution for one month as enzyme solution. Unreacted sodium bicarbonate-C-14 was removed by adding acetic acid. The radioactivity of the reaction mixture was then measured with a gas flow counter, and the result was used to indicate the degree of carbonic acid fixation. When water in the reaction mixture was replaced by sodium sulfite or sodium sulfate and the amount of bicarbonate-C-14 fixed for 20 minutes was measured, it was found that the fixation decreased as the sulfite concentration increased, about 85% being inhibited at .003 M. There was almost no effect of sulfate ion at the same concentration. These results indicate that sulfur dioxide inhibits ribulose-2-phosphoric carboxylase, and that at .00003 SO₂ concentration, the carbonic acid fixation would be inhibited.

22783

APTIC NO. 41696

Zieger, Erich

SMOKE-INDUCED DAMAGE TO FORESTS (*Rauchschaeden im Walde*). Text in German. Wiss. Z. Tech. Hochsch. Dresden, 3(2):271-280, 1953-1954. 22 refs.

Problems of smoke-induced damages and appropriate control measures are reviewed. Fly ash and waste gases are the pollutants involved in forest damages. Fly ash depositing chiefly in zones of 100-600 m around high stacks turns the soil gradually sandy. Sulfur dioxide is the most dangerous of all waste gases, followed by sulfuric acid, hydrofluoric acid, nitric acid, fluorine compounds, ammonia, hydrogen sulfide, and tar vapors. Both the character and the measure of the damages are determined by such factors as distance from the emission source, dilution, and season. Regarding damages due to etching different species show different degrees of resistance, conifers being highly sensitive. Damages due to disturbed assimilation are most important in humid weather and in old needles. The sensitivity increases with increased assimilation activity. The incrustation damages caused by dust build-up on leaves and needles are of a local character. The pollutants also affect the soil, turning it acid, and changing its physical and chemical properties. The control measures should be applied at the emission source proper. The fine fractions of the fly ash, amounting to 50-75%, are hard to retain, and high stacks cannot be regarded as an adequate solution. Various methods of dust separation are discussed. There are no adequate methods for sulfur dioxide control available. The breeding of smoke-resistant stands, the plantation of shelter woods, and liming are some of the steps to be taken by forestry.

EFFECTS-MATERIALS

22784

APTIC NO. 41150

Becker, G.

WEATHERING TESTS ON HOT GALVANIZED, ELECTROLYTICALLY GALVANIZED AND HOT ALUMINIZED WIRES OF DIFFERENT DIAMETERS IN INDUSTRIAL, RURAL AND SEA ATMOSPHERES. *Stahl Eisen (Duesseldorf)*, vol. 90:559-566, May 1970. 11 refs. Translated from German. British Iron and Steel Industry Translation Service, London (England), 19p., Nov. 1970.

The weathering behavior of hot dip and electrolytically galvanized wires and hot aluminized wires of various diameters in sea, rural, and industrial atmospheres was investigated over three years. Whereas the effect of the type of galvanizing upon weathering resistance was slight, the effect of the geometrical form of the wire itself was significant. The zinc deposit on wire of about 0.85 mm. diameter weathered more than six times faster than that on plain sheet at the same test station. Tests on galvanized steel wire in New York atmosphere revealed that corrosion was greater with thinner than thicker wire. More severe weathering is considered possible with thinner wire since with this the air change, and hence the supply of sulfur dioxide, is more rapid than with thicker wire. The rate of corrosion of zinc was, as expected, much lower in rural atmospheres than in industrial atmospheres. Seasonal variations were demonstrated with less corrosion in summer months than in winter, the differences being dependent on the higher content of sulfur dioxide in winter months. Sea atmospheres also contributed to an increase in weathering over that of rural atmospheres.

22785

APTIC NO. 41725

Cutler, A. J. B., W. D. Halstead, J. W. Ixton, and C. G. Stevens

THE ROLE OF CHLORIDE IN THE CORROSION CAUSED BY FLUE GASES AND THEIR DEPOSITS. *J. Eng. Power*, 93(3):307-312, July 1971. 30 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, New York, Nov. 29-Dec. 3, 1970, Paper 70-WA/CT-1.)

EFFECTS-MATERIALS

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22789

The role of chloride in the corrosion of oil- and coal-fired boilers and gas turbines is discussed on the basis of both experimental and theoretical studies. In most coal and oil-fired boilers, residence times upstream of deposits are sufficient for the excess oxygen levels are large enough (above 1%) to insure that the bulk of the chloride is converted to gaseous hydrogen chloride. Chloride will not, therefore, be condensed as an independent phase in the deposits, and the hydrogen chloride will have little effect on any metal surface with which it comes into contact. Furthermore, the absorption of gaseous chloride by the deposits will not enhance their long-term corrosiveness. In a few boilers which are too small for chemical equilibrium to be established in the flue gases however, and also in those boilers in which equipment is misaligned or malfunctioning a number of situations can be met with in which alkali metal chlorides can be introduced into deposits as separate phases, subsequently to encourage excessive rates of corrosion. A similar situation is encountered in gas turbines, where particulate chloride can break away from the internal faces of air filters to subsequently impinge on the blades. The presence of chloride as an independent phase, on a surface, no matter by what mechanism it is introduced, may be taken as an indicator of enhanced rates of attack on the metal. If the general atmosphere permeating the deposit is oxidizing, then the chloride can play an active role in the corrosion process. If it is reducing, the atmosphere may cause enhanced rates of corrosion, via destruction of any protective oxide layer or sulfidation of the metal, the chloride itself playing little or no direct part. (Author discussion modified)

22786

APTIC NO. 41949

Engels, Albrecht

THE RESISTANCY OF STEEL AGAINST CARBON DIOXIDE AT INCREASED TEMPERATURES. (*Die Bestaendigkeit von Staehlen gegen Kohlendioxid bei Erhoehten Temperaturen*). Text in German. *Stahl Eisen* (Duesseldorf), 92(9):416-419, April 1972. 29 refs.

Different factors influencing the resistivity of steel against carbon dioxide are reviewed. The scaling of steel in pure, dry CO₂ atmospheres showed irregular increase with the time. Gain in weight with increased temperatures and the absence of protective layers at high temperatures were observed. Carbon monoxide additions to CO₂ reduced the scaling rate of unalloyed and low alloy steels primarily at low temperatures, but caused only slight decrease in the scaling rate of high-alloyed steel. Additions of water vapor to the CO₂ slightly increased the scaling rate of austenitic steels, but this effect abated at high temperatures. The effect of water vapor on unalloyed and low alloy steels was, however, important. The rupture of the scale in unalloyed and low alloy steels was retarded by both methane and hydrogen additives. Increased gas flow rates considerably affected the scaling of low alloy chromium-molybdenum steels at high temperatures, while the even effect of low flow rates on austenitic chromium-nickel steels was considerable. Both the scaling rate and scale ruptures of unalloyed and low alloy steels were increased by increased pressures, primarily in humid atmospheres, while this effect on austenitic steels might be considered. The resistivity of polychromium steel was lower than that of a polychromium-free steel. Both unalloyed and low alloy steels possessed high resistivity, while some low alloy steels possessed very unfavorable behavior in atmospheres of 0.1-0.2% oxygen up to 0.1%, yttrium in a maximum amount of 0.02%, as well as silicon had the resistivity of steel, which copper and manganese had negative effects. Carburation decreased with increased chromium content and reduced temperature.

22787

APTIC NO. 41723

Evakin, Yu. P., R. A. Petrosyan, L. M. Tsirulnikov, I. I. Nadyrov, I. I. Akbarov, M. P. Zaitseva, M. A. Uranbaev, and T. B. Efendiev

HIGH-TEMPERATURE GAS AS AN ENERGY PRODUCING FUEL. *Issledovanie vysokotemperaturnogo gaza kak energo-*

gicheskogo topliva). Text in Russian. *Teploenergetika*, no. 1:18-22, Jan. 1972. 2 refs.

Gases from the Sokh River field, average hydrogen sulfide content 1.75-3.05%, were fired in a test boiler. Data for low temperature and high temperature corrosion are plotted against boiler wall temperature and against sulfur trioxide in the flue gas. Decreasing excess air increased H₂S in the flue gas during high temperature corrosion. The corrosion rate rose with temperature, but above 560 C it decreased. Corrosion produced mainly ferric oxide with 1-2% iron sulfates. Low temperature corrosion can be held down with low excess air, but this may lead to severe high temperature corrosion. Analyses of eight gases, average H₂S content 0.29-5.92% by volume, are tabulated along with heats of combustion (8080-8490 cal/cm³).

22788

APTIC NO. 42170

Kautz, K. and J. Tichatschke

CONNECTIONS BETWEEN FLUE GAS CONDITIONS, BOILER LOAD AND CORROSIONS IN A COMMUNAL INCINERATOR. (*Zusammenhaenge zwischen Rauchgasverhaeltnissen, Kesselbelastung und Korrosionen in einer kommunalen Muellverbrennungsanlage*). Text in German. *Mitt. Ver. Gross-Kesselbetr.*, 5:243-249-258, June 1972. 3 refs.

The causes for the corrosion of the preheater, the evaporator pipes, and the electrostatic precipitator in an incinerator which was put into operation in November 1965 were studied. The incrustations and corrosion products were chemically analyzed. For identification of compounds in the incrustation samples x-ray analysis was used, and the synthesis of those compounds which could not be identified was attempted beginning with simple possible compounds. The properties of several compounds found in the incrustations in various gas atmospheres were studied in the laboratory. It was found that all corrosions on the flue gas side of the incinerator were due to reactions with chlorine compounds. Several reaction mechanisms may take place. Alkali chlorides may condense on superheater pipes. The chlorine liberated by this process reacts with silicon dioxide, aluminum oxide, and iron oxide as long as these components are available in the incrustations. If the quantity of liberated chlorine exceeds a certain limit value it reacts with the oxide layer of the steel and thus leads to corrosion. Pipes located in narrowings show erosions which stem from the fact that the protecting sulfate layers are not permitted to form or that they are constantly carried away. The bare pipe surface is then attacked by hydrochloric acid. On the electrostatic precipitator electrode, alkali and zinc sulfates and chlorides develop which form melts within the range of operating temperatures. These melts attack the electrodes by way of iron chloride formation. The corrosions on the superheater pipes and in the electrostatic precipitator are mainly due to overloading of the incinerator through higher refuse throughput and an increase of the heating value. Another cause for the corrosions is the locally high flue gas speeds.

22789

APTIC NO. 40967

Kurian, P. M. and R. V. Panthankar

DIFFERENTIAL THERMAL ANALYSIS OF THE TRANSFORMATIONS OF SOME COPPER BEARING INDIAN MINERALS-THE ROASTING REACTION. *Trans. Indian Inst. Metals*, 24(2):17-21, June 1970. 32 refs.

Transformations of copper pyrite upon roasting in air were studied thermally, along with some related compounds, such as oxides, sulfides and sulfates of copper and iron in pure and mixed states. The primary product of oxidizing a metal sulfide is a sulfate and not, as previously reported, an oxide, and the oxide obtained below the decomposition temperature of the sulfate is a secondary product of the reaction between sulfide and sulfate. The oxidation of chalcopyrite under the experimental conditions, which, in fact, occurs in the interface, is chemically controlled in the initial stage since there is easy access of the reactants to the interface, and the oxidation is practically complete in the order of minutes.

22790

APTIC NO. 42144

Levshunov, R. T., A. A. Novikov, and L. F. Khranov

DISCHARGE VOLTAGES OF HIGH-VOLTAGE INSULATORS DUE TO POLLUTION. (*Gryazerazryadnyye napryazheniya visokovol'nykh izolyatorov*). Text in Russian. *Elektr. St. (Moscow)*, no. 10:61-63, 1971. 4 refs.

The discharge voltages of 26 different suspension and spreader insulators of 1-100 kohms due to pollution were investigated using the frequent wetting method. The insulator surfaces were artificially polluted to reach a concentration of 3-5 mg/sq cm, after which the dried surfaces were wetted by a solution with definite salt content. The discharge voltages of suspension and spreader insulators with pollutant layer resistivity the same were practically identical. The discharge voltage was a linear function of the number of components in the insulator string for different pollutant resistances. Variations in the pollutant resistivity within a range of 1 to 5 kohms caused no variations in the discharge voltage of dish type suspension and pin insulators, which was mainly dependent on the length of the leakage path. The results, of high reproducibility, can be used for choosing insulation levels for insulators to be used in highly polluted areas.

22791

APTIC NO. 41792

Ono, Hiroshi, Kotaro Watanabe, and Hajime Suzuki

STABILIZATION OF URETHANE POLYMERS. (*Toyo Boseki Kabushiki Kaishi, Osaka (Japan)*) U. S. Pat. 3,649,594. 12p. March 14, 1972. 5 refs. (*Appl. Oct. 11, 1968, 10 claims*)

Generally, polymers based on isocyanates or so-called urethane polymers have the disadvantage that, when exposed to atmospheric conditions or combustion gases such as hydrocarbons or nitrogen oxide gases, there is a yellowing or burning of the material. Most of the known stabilizers are not sufficiently satisfactory to resist gas discoloration of polyurethane or else they spoil other properties of the urethane polymer. Compounds are described which can be added to urethane polymers to stabilize them against discoloration.

22792

APTIC NO. 41066

Rozenfel'd, I. L.

ATMOSPHERIC METAL CORROSION AND CORROSION PROTECTION. (*Atmosfer'naya korroziya i zashchita ot ney*). Text in Russian. *Zh. Vses. Khim. Obshchestva im. D. I. Mendeleeva*, 16(6):614-642, 1971. 33 refs.

The principal reaction mechanisms of atmospheric corrosion as well as different protective measures are reviewed. Sulfur dioxide and nitrogen oxides are the chief pollutants causing corrosion. The corrosion rate in industrial and urban areas and in areas with high traffic density is much higher than in the country due to the effect of air pollution. The electrochemical principles of atmospheric corrosion are described, and theories on the intensifying effect of SO₂ are analyzed. As the SO₂ present in the air is readily absorbed by the electrolyte membranes coating metal surfaces, the sulfurous acid concentrations may reach values of 0.001 to 0.0001 mol/l, and the pH values may be shifted to 3-3.5. Theories on the intensifying effect of SO₂ due to sulfuric acid formed by oxidation are not acceptable. An alternative theory is presented which explains the intensifying effect by the fact that the acceleration of the cathodic processes in the presence of SO₂ is primarily due to the powerful depolarizing effect of SO₂. The regeneration of the SO₂ leads to the formation of thiosulfate (S₂O₃²⁻) or hydrosulfurous acid (H₂S₂O₄) ions, and sulfur ions may form from the latter. The potentials of the above reactions lie much higher than the positive stationary potentials of most common metals, and the corrosion rate is much higher in an oxygen-free atmosphere containing SO₂ than in the presence of O₂; both facts corroborate the above theory. As the hydrosulfurous acid is not stable, it forms both sulfurous and sulfuric acids in a reaction with oxygen. Various corrosion-protective measures such as the use of low-alloy steels and aluminum

and titanium alloys, aluminum and zinc coatings, and different types of corrosion inhibitors are described.

22793

APTIC NO. 42147

Shamsiyev, A. S.

EVALUATING THE EFFECT OF THE PARAMETERS OF POLLUTED INSULATORS ON THEIR DISCHARGE VOLTAGES CAUSED BY MOISTURE. (*Otsenka vliyaniya parametrov zagryaznennykh izolyatorov na ikh razryadnyye napryazheniya*). Text in Russian. *Elektrichestvo*, no. 10:38-43, 1971. 4 refs.

The effects of various parameters of polluted and wet suspension insulators on their discharge voltage were studied. The electrical strength of such insulators was dependent on the surface conductivity, the critical arc length, and the dish diameter. Discharge voltages determined for 10 different suspension insulator designs from a formula describing the discharge voltage of polluted and wet insulators and by means of a graphic method showed good accordance with values ranging from 0.57 to 0.71 kV/cm, and experimental data were in line with the above results. The discharge voltage as caused by moisture can be increased by enlarging the lateral surface as well as by increasing the critical arc length or the diameter of the lower dish relative to the upper one, or the dish inclination to the insulator axis. The discharge voltage was strongly influenced by the surface shape of the insulator, particularly of the dish, and by the aerodynamic characteristics. Simple insulator shape (smooth dishes) were best. 0

22794

APTIC NO. 40978

Tideswell, N. W.

CORROSION OF NICKEL BY HYDROGEN SULFIDE.

Corrosion, 28(1):23-25, Jan. 1972. 11 refs.

A combination of reflection electron diffraction and x-ray diffractometry was used in determining the composition and crystallographic orientation of nickel sulfide scales. The corrosion products produced below the Ni₃S₂-Ni eutectic temperature, 637°C, consists of a thick inner layer of Ni₃S₂ and a thin outer layer of NiS. Polycrystalline Ni gives polycrystalline products with random orientation. Single crystal Ni with the (001) plane exposed gives preferred orientation in both layers. The inner layer of Ni₃S₂ grows with the (001) plane parallel to Ni (001). The millerite and Ni arsenide forms of NiS grow with their (110) planes parallel to Ni (001). Small amounts of alpha and beta-Ni₇S₆ are produced. (Author summary modified)

EFFECTS-ECONOMIC

22795

APTIC NO. 41121

EXPENDITURES OF THE CHEMICAL INDUSTRY FOR INCREASING ENVIRONMENTAL PROTECTION

(*Aufwendungen der Chemie für Umweltschutz nehmen zu*). Text in German. *Chem. Ind. (Düsseldorf)*, 24(5):272-275, May 1972.

From 1960 to 1969, the chemical industry in the Federal Republic of Germany spent approximately 1.1 billion for environmental protection measures. This consisted of investments for environmental protection, 0.42 billion; operation costs for environment protection plants; and 0.68 billion for research and development programs. The emissions of sulfur dioxide, carbon monoxide, nitric oxide, fluorine and solid particles from the chemical industry were less than 2% of the total emitted quantity. The nuisance of emissions from the chemical industry is due more to bad odors than to gases endangering human health. Investments of the chemical industry for protective measures against air pollution increased from 34.1% in the period 1960/1964 to 35.1% in the period 1965/69 and will amount to only 24% in 1974.

EFFECTS-ECONOMIC

22800

22796 APTIC NO. 41352
Public Health Service, Raleigh, N. C., National Air Pollution Control Administration

ECONOMIC IMPACT OF AIR POLLUTION CONTROLS ON GRAY IRON FOUNDRY INDUSTRY. Publ. AP-74, 124p., Nov. 1970. 75 refs.

GPO

Nationally, gray iron foundries rank as one of the largest industries in terms of value of shipments, employment, and particulate pollution. Emissions in 1966 amounted to 190,000 tons, which was 2.9% of the 5.9 million tons of particulates emitted by industrial processes into the nation's atmosphere. In 1967, particulate emissions were controlled from 204, or about 11% of the 1376 foundries in the gray iron industry. About half the foundries shipped less than \$1.0 million in castings; and of those, only about 5% operate air pollution control systems. The four most common pollution control devices, in ascending order of collection efficiency, are wet caps, multiple cyclones, wet scrubbers, and fabric filters. Nearly half the foundries with control systems use low-cost, low-efficiency wet caps, which do not usually satisfy stringent emission regulations. Industry considerations as to whether and how to control air pollution have been influenced by state and local regulations. Federal activity under the Clean Air Act will serve to intensify state and local efforts to combat air pollution. A comparison of pollution control costs determined from the interview survey with industry financial data provided by the Internal Revenue Service suggests that the impact of stringent pollution control on small firms is greater than on large firms. The annual cost of controlling air pollution, as a percent of profits before taxes, declines, as size increases, from 59% for a typical firm with value of casting shipments under \$0.5 million to 11% for a typical firm with over \$10 million in value of shipments. The possibility of foundries shifting air pollution control costs is limited by the price behavior in markets serving and served by the industry. The growth of larger foundries, the relative increase in casting prices and decrease in raw materials prices, and the increasing profit and capital shares of the industry will allow larger firms to distribute the burden of air pollution control more widely. (Author summary modified)

22797 APTIC NO. 41494
Consad Research Corp., Pittsburgh, Pa.

THE OAP REGIONAL ECONOMIC MODEL UTILIZATION. PHASE I VOLUME II: REVISED USER'S GUIDE. (FINAL REPORT). Office of Air Programs Rept. APTD 0946, 142p., Jan. 7, 1972. 3 refs.

NTIS: PB 201320

A revised user's guide for the Economic Model System to facilitate an efficient assessment of the effects of air pollution abatement is presented. The computer simulation programs of the system include program RMS (Regional Model Simulation), program IOA (Input-Output Analysis), and program FBE (Feedback Effects). In program RMS, linkages between the modules were rearranged in order to provide an efficient and broad range of strategy simulations. Simulation options which are related to a number of control inputs corresponding to the control strategy under consideration are provided for by the arrangement of the modules. Program IOA has the capability of aggregating a 100 sector U.S. input-output table to a desired number of sectors. Changes in final demand, both as a result of costs and benefits of air pollution control, will cause changes in gross domestic product (value of shipments by sector). Program FBE takes the output from program IOA and first transfers the value of shipment into value added by sector and then distributes the feedback effect to each air quality control region with the regional market share matrix. The guide examines each program in detail with reference to job deck set-up, data input deck, description of the program deck, and the program itself.

22798 APTIC NO. 41148
Goekel, Jack I.

COST EFFECTIVENESS ANALYSIS AND THE CONTROL OF PHOTOCHEMICAL SMOG. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 7p., 1970. 4 refs. (Presented at the Air Pollution Control Association, West Coast Section, Technical Meeting, 5th, San Francisco, Oct. 1970.)

The same calculation method and ground rules must be used to compare the cost effectiveness indexes of various approaches. In order to compare devices with a 10-year life with other short-term approaches such as gasoline modifications, it is desirable to evaluate both controls over a 10-year period. Ground rules and calculation procedures were listed. A summary of sample calculations was given. Sample cost-effectiveness calculations for used car control kits, lean idle-spark timing modification, evaporative control devices on 1970 cars, and 1966-1969 new car exhaust devices were presented.

22799 APTIC NO. 41466
Miller, A. J., H. R. Payne, M. E. Lackey, G. Samuels, M. T. Heath, E. W. Hagen, and A. W. Savolainen

USE OF STEAM-ELECTRIC POWER PLANTS TO PROVIDE THERMAL ENERGY TO URBAN AREAS. Oak Ridge National Lab., Tenn., Dept. of Housing and Urban Development Contract W-7405-eng-26, IAA H-5-59 Rept. ORNL- HUD-14, UC-80, 192p., Jan. 1971. 75 refs.

NTIS: ORNL- HUD-14

The feasibility of providing thermal energy, as well as electricity, to urban areas from steam-electric power plants was studied. A 1980 reference city of 389,000 people with a climate similar to that of Philadelphia was analyzed. Thermal energy extracted from the turbines of a generating plant that employed light-water reactors would be used for providing space heat, hot water, and air conditioning for the commercial buildings and the two-thirds of the city inhabitants who lived in three-story apartment buildings. Heat would also be supplied for manufacturing processes and desalting sewage plant effluent for reuse. The use of heat in the reference city would reduce the average heat rejected to the plant's cooling water to about 63% of that which would be rejected from a single-purpose plant, and this heat rejection would be reduced to 21% of that from a single-purpose plant during the period of maximum heat consumption in the summer. The cost of distributed hot water in the reference city was estimated at 142.5 cents/MBtu, which is competitive for most U.S. cities. The cost for space heating and domestic hot water would be 198 cents/MBtu. Since the use of rejected or extracted heat for many heat-consuming processes would conserve all or part of the fossil fuel that would otherwise have to be burned in order to provide heat, such uses would eliminate the atmospheric pollution from gases and particulates caused by the additional combustion process and also avoid the accompanying heat addition to the atmosphere. A national program therefore, to determine heat rates for most economical supplies of energy is recommended.

22800 APTIC NO. 41009
Pelka, Stanislaw

ECONOMICAL PROBLEMS OF ENVIRONMENTAL PROTECTION. (Ekonomiczne problemy ochrony srodowiska) Text in Polish. Chemik (Gliwice), 25(3):93-96, March 1972. 1 ref.

The economical effect of human activity on the natural environment, air pollution, and water contamination are briefly discussed. The problems are illustrated by statistical data and estimation. The proposition is made to debit every enterprise with the full cost of damages to the natural environment. Such a proposition may accelerate the solutions of the problems.

22801

APIC NO. 42032

Yar. Tor. M. de and Bilbao Goyaga

INDUSTRIAL AIR POLLUTION IS A FINANCING PROBLEM. *Dyna (Madrid)*, 46(6):281-282, 1971.

Equipment to control dust, fumes, gas, smog, and odors resulting from various industrial operations is expensive to purchase and operate, and the investment for such equipment produces no income. To assist Spanish industries in reducing pollution, financial assistance in the form of very long-term loans with low interest is needed. The Presidential Order of Feb. 13, 1971 gives priority for official credit concessions to installations for industry of air and water-purification equipment, but the Order does not provide for low-interest, long-term loans. Savings banks are suggested as a source of low-interest, 5-year loans for small equipment costing \$43,000, 7 years for equipment costing \$100,000 to \$175,000; and 10 years or more for equipment costing more than \$286,000. Official municipal and other bodies should use their influence on the savings banks in each region of Spain to create this line of financing. The basic advantages of such a program include social well-being, relief of a potentially acute problem, immediate interest by industries and factories in solving the problem, and creation of an appropriate climate for using Spanish technology.

22802

APIC NO. 41523

Werner, Volker, J.

POWER, ENVIRONMENT, AND YOUR POCKETBOOK. *Pub. Util. Fortn.*, 94(14):27-31, June 25, 1972. (Presented at the Tennessee Valley Power Association Annual Meeting, Nashville, Tenn., March 15, 1972.)

A long-term view of the potential impact of various environmental control requirements upon TVA's cost of providing power is presented. Responsible strip mine reclamation can be accomplished for \$10 million per year. If proposed refinements in reclamation procedures are required or if strip mining should be phased entirely, the estimated cost would be \$30 million or \$400 million, respectively. It will cost about \$15 million annually to improve safety requirements for deep mined coal. Due to a current program of upgrading electrostatic fly ash collection equipment at its coal burning plants, the TVA is able to meet the federal standard adopted in 1966. However, to meet the stricter standards imposed by the states of Kentucky, Tennessee, and Alabama could cost as much as \$35 million annually. Proposed regulations on sulfur dioxide emissions and the cost of coal containing sulfur might add \$300 million to annual costs. Installation of cooling towers would cost about \$320 million. Costly licensing delays can also be expected in the near future. Cost of undergrounding the TVA high voltage transmission system would be prohibitive, about \$1 billion. The power revenues of TVA last year were approximately \$100 million.

STANDARDS AND CRITERIA

22803

APIC NO. 40988

Ogino, Prefectural Government (Japan), Div. of Atmosphere

AIR REGULATIONS IN OSAKA PREFECTURE.

Osaka fu no okeru kensa kiset ni tsuiteki. Text in Japanese. Osaka no Seisaku. Osaka, no. 1155, 56, April 1972.

In 1969, the average sulfur dioxide concentration in the industrial area of Osaka Prefecture was about 30% higher than the standard value of 0.09 ppm, which was determined by the government. It is estimated that the fuel consumption would be 13,450,000 kl in 1973 and 14,000,000 in 1975, and the amount of sulfur oxides discharged in 1975 had to be controlled not to exceed 200,000 tons. Fuel regulations issued by

the prefectural government, effective Sept. 10, 1971, were as follows: the sulfur content of fuel should be less than 1.2% in 1972 and less than 1.0% in 1973. The standard values were determined by considering the factory locations and district pollution characteristics. By the same considerations, it was estimated that the standard sulfur content of fuel consumed in 1975 should be less than 0.7%.

22804

APIC NO. 42039

Japan Environmental Agency, Tokyo, Bureau of Atmospheric Safety

STRICT LOCAL EMISSION STANDARDS BASED ON AIR POLLUTION CONTROL LAWS. *Chukai koso boshu ni motozuku uwamose haishutsu kyon juseishu*. Text in Japanese. Sangyo Kogyo (Ind. Public Nuisance), 8(6):45-50, June 1972.

Japanese local emission standards, based on air pollution control laws are discussed. By 1972 there were 17 Prefectures in which these standards were applied. Such standards are given for cadmium, fluorine, lead, chlorine, hydrogen chloride, and dust. The Prefectures are Akita, Fukushima, Ibaragi, Gumma, Saitama, Kanagawa, Tohoku, Mie, Osaka, Nara, Okayama, Ehime, and Niigata. The new standards were applied to hydrogen fluoride and silicon fluoride.

22805

APIC NO. 41532

Bardodej, Z.

ACETONE. In: *Documentation of MAC in Czechoslovakia*. Czechoslovak Commission for MAC, Prague, p. 1-7, June 1969. 6 refs.

Acetone possesses irritating and narcotic properties. Maximum allowable concentrations in different countries range from 200 to 2400 mg/cu m. Acetone vapor tension is so high that, with air, an explosive mixture may form. The suggested MAC values for Czechoslovakia are 800 mg/cu m (mean) and 4000 mg/cu m (peak). The findings of several investigators are noted.

22806

APIC NO. 41248

Bardodej, Z.

CARBON MONOXIDE. In: *Documentation of MAC in Czechoslovakia*. Czechoslovak Commission for MAC, Prague, p. 40-42, June 1969. 19 refs.

Carbon monoxide blocks hemoglobin and induces central nervous symptoms. Maximum allowable concentrations in different countries range from 20 to 58 mg/cu m. The suggested MAC values for Czechoslovakia are 30 mg/cu m (mean) and 150 mg/cu m (peak). The findings of various investigators are noted.

22807

APIC NO. 41249

Bardodej, Z.

CARBON TETRACHLORIDE. In: *Documentation of MAC in Czechoslovakia*. Czechoslovak Commission for MAC, Prague, p. 43-44, June 1969. 10 refs.

Carbon tetrachloride damages the liver and kidney, has a narcotic effect, and irritates mucous membranes. Maximum allowable concentrations in different countries range from 20 to 320 mg/cu m. The suggested MAC values for Czechoslovakia are 50 mg/cu m (mean) and 300 mg/cu m (peak). The findings of several investigators are noted.

22808

APIC NO. 41251

Bardodej, Z.

CHLOROPRENE. In: *Documentation of MAC in Czechoslovakia*. Czechoslovak Commission for MAC, Prague, p. 54-55, June 1969. 6 refs.

Chloroprene damages the liver, kidney, vascular system, and mucous membranes, causes cancer, and has a narcotic effect.

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fect. Maximum allowable concentrations in different countries range from 2 to 92 mg/cu m. The suggested MAC values for Czechoslovakia are 50 mg/cu m (mean) and 100 mg/cu m (peak). The findings of several investigators are noted.

22809

APTIC NO. 41257

Bardodej, Z.

CRESOL. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 61-62, June 1969. 3 refs.*

The o-, m-, and p-cresols occur simultaneously. Their effect is similar to phenol. The least toxic isomer is m-cresol. Maximum allowable concentrations range from 5 to 22 mg/cu m in different countries. Suggested MAC was 20 mg/cu m (mean) and 40 mg/cu m (peak).

22810

APTIC NO. 41258

Bardodej, Z.

1,2-DICHLOROETHANE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 63-64, June 1969. 4 refs.*

The compound, 1,2-dichloroethane damages the liver, kidney, and suprarenal glands, and has narcotic and irritating effects. Extreme care with this substance is recommended. Maximum allowable concentrations in different countries vary from 20 to 400 mg/cu m. The suggested MAC values for Czechoslovakia are 50 mg/cu m (mean) and 250 mg/cu m (peak). The findings of several investigators are noted.

22811

APTIC NO. 41311

Bardodej, Z.

PHENOL. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 129-130, June 1969. 5 refs.*

Phenol is mainly an irritant with some central nervous system effects. Maximum allowable concentrations in different countries vary from 5 to 20 mg/cu m. The considerable etching effect of phenol on the skin and possible percutaneous resorption necessitate care when handling liquid phenol, especially when it is heated. The suggested MAC values for Czechoslovakia are, mean, 20 mg/cu m and peak, 40 mg/cu m. The findings of several investigators are noted.

22812

APTIC NO. 41336

Bardodej, Z.

SOLVENT NAPHTHA. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 143, June 1969.*

Solvent naphtha, a mixture of cumene and xylene, is an anesthetic with an irritant effect and is considered as hazardous as xylene. Maximum allowable concentrations in different countries range from 100 to 800 mg/cu m. The suggested MAC values for Czechoslovakia are (mean) 200 mg/cu m and (peak) 1000 mg/cu m.

22813

APTIC NO. 41337

Bardodej, Z.

STYRENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 144-145, June 1969. 12 refs.*

Styrene possesses narcotic and irritating properties, and has an odor of lighting gas which clings to the clothes and hair. Maximum allowable concentrations in different countries vary from 5 to 426 mg/cu m. Exposure to styrene may be controlled by determination of mandelic acid in urine. The suggested MAC values for Czechoslovakia are 200 mg/cu m (mean) and 1000 mg/cu m (peak). The findings of several investigators are noted.

22814

APTIC NO. 41340

Bardodej, Z.

TECHNICAL GASOLINES. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 151-152, June 1969. 7 refs.*

Technical gasolines are predominately mixtures of aliphatic hydrocarbons. The gasolines are an inhalation anesthetic with irritating effects on the mucous membranes. Maximum allowable concentrations in different countries vary from 300 to 7950 mg/cu m. When working with gasoline, the air must be checked for aromatic hydrocarbons. The suggested MAC values for Czechoslovakia are 500 mg/cu m (mean) and 2500 mg/cu m (peak). The findings of several investigators are noted.

22815

APTIC NO. 41341

Bardodej, Z.

TETRACHLOROETHYLENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 153-154, June 1969. 2 refs.*

Tetrachloroethylene is an anesthetic and has an irritating effect on the mucosa. Maximum allowable concentrations in different countries vary from 50 to 1380 mg/cu m. The suggested MAC values for Czechoslovakia are 250 mg/cu m (mean) and 1250 mg/cu m (peak). The findings of several investigators are noted.

22816

APTIC NO. 41344

Bardodej, Z.

TRICHLOROETHYLENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 159-160, June 1969. 13 refs.*

Trichloroethylene is an inhaling anesthetic with irritating properties. Maximum allowable concentrations in East and West Germany, Great Britain, Hungary, Poland, United States, Soviet Union, and Yugoslavia vary from 50 to 2188 mg/cu m. The suggested MAC values for Czechoslovakia are 250 mg/cu m (mean) 1250 mg/cu m (peak). The findings of several investigators are noted.

22817

APTIC NO. 41346

Bardodej, Z.

XYLENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 165, June 1969. 2 refs.*

Xylene possesses narcotic and irritant properties. Maximum allowable concentrations vary to 870 mg/cu m in other countries. The suggested MAC values for Czechoslovakia are, mean, 200 mg/cu m and peak, 1000 mg/cu m.

22818

APTIC NO. 42118

Chevin, P.

AUTOMOBILE POLLUTANTS AND THE URBAN AIR QUALITY. (Les polluants de l'automobile et la qualité de l'air des sites) Text in French. Pollut. Atmos. (Paris), 14(4):172-176 April-June 1972.

Current and future automotive emission standards are reviewed, and the activity of the Central Laboratory of the Paris Police Headquarters in the exhaust monitoring area is described. Results of carbon monoxide, nitrogen dioxide, and lead concentration measurements performed in Paris in 1971 are presented. Systematic measurements will also cover suburbs as of 1972. New exhaust emission standards, according to the European cycle specifications, will become effective in October 1972, and further reductions of 20% and 10% in the CO and hydrocarbon emissions will be expectedly imposed in 1972. The imposition of air quality standards has been suggested. Despite the increase in the number of automobiles and the traffic density, particularly in suburban zones, the 1985

emission levels will not exceed the present day values due to the reduction of the specific emissions.

22819 APTIC NO. 41245

Fiserova-Bergerova, V.

CADMIUM OXIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 29-31, June 1969. 10 refs.*

Cadmium oxide causes irritation of the mouth and nose as well as cough, headache, and danger of lung edema after 36 hours. Pneumonia may be induced. The maximum allowable concentration in different countries is 0.1 mg/cu m. The suggested MAC values for Czechoslovakia are 0.1 mg/cu m (mean) and 0.5 mg/cu m (peak). However, with the mean exposure concentration, a yellow rim may appear around the teeth. The findings of various investigators are noted.

22820 APTIC NO. 41294

Fiserova-Bergerova, V.

HYDROGEN CYANIDE AND CYANIDES. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 91-92, June 1969. 3 refs.*

Hydrogen cyanide is a tissue poison which attacks the enzymatic breathing system. Maximum allowable concentrations in different countries range from 0.3 to 11.0 for HCN and 0.3 to 11.0 mg/cu m for CN. Since hydrogen cyanide does not have a cumulative effect, a mean concentration of 3 mg/cu m is suggested for Czechoslovakia. The recommended peak MAC is 15 mg/cu m. The findings of several investigators are noted.

22821 APTIC NO. 41296

Fiserova-Bergerova, V.

HYDROGEN SELENIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 96-97, June 1969. 5 refs.*

Hydrogen selenide has mainly irritant effects, but with sudden increases in concentration lung edema and toxic bronchopneumonia may occur. Maximum allowable concentrations in different countries range from 0.1 to 0.3 mg/cu m. The suggested MAC values for Czechoslovakia are 0.1 mg/cu m (mean) and 0.2 mg/cu m (peak).

22822 APTIC NO. 41297

Fiserova-Bergevova, V.

HYDROGEN SULFIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 98-100, June 1969. 8 refs.*

Hydrogen sulfide causes irritation and then suffocation. A warning odor may be distinguished in low concentrations. Maximum allowable concentrations in different countries range from 10 to 30 mg/cu m. The suggested MAC values for Czechoslovakia are 10 mg/cu m (mean) and 20 mg/cu m (peak). The findings of various investigators are noted.

22823 APTIC NO. 41236

Fuchs, A.

AMYL ACETATE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 9-10, June 1969. 5 refs.*

Amyl acetate causes irritation followed by narcotic effects. It is not especially toxic. Exposure frequently yields complaints of irritating smell and fatigue. Maximum allowable concentrations in different countries range from 100 to 1000 mg/cu m. The suggested MAC values for Czechoslovakia are 200 mg/cu m (mean) and 1000 mg/cu m (peak). The findings of several investigators are noted.

22824 APTIC NO. 41241

Fuchs, A.

BENZENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 19-22, June 1969. 16 refs.*

Benzene has a toxic effect on blood formation. Maximum allowable concentrations in different countries range from 20 to 160 mg/cu m. The suggested MAC values for Czechoslovakia are 50 mg/cu m (mean) and 250 mg/cu m (peak). The findings of various investigators are noted.

22825 APTIC NO. 41251

Fuchs, A.

CHLORINE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 47-48, June 1969. 4 refs.*

Chlorine is a strong irritant with good warning properties. Maximum allowable concentrations in different countries range from 1 to 3 mg/cu m. The suggested MAC values for Czechoslovakia are 3 mg/cu m (mean) and 6 mg/cu m (peak). The findings of various investigators are noted.

22826 APTIC NO. 41260

Fuchs, A.

DIETHYLETHER. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 66-67, June 1969. 6 refs.*

The main dangers of diethylether are its high narcotic effects and frequent etheromania. Maximum allowable concentrations in different countries vary from 300 to 1500 mg/cu m. The suggested MAC values for Czechoslovakia are 300 mg/cu m (mean) and 1500 mg/cu m (peak). The findings of various investigators are noted.

22827 APTIC NO. 41264

Fuchs, A.

ETHYL ACETATE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 72-73, June 1969. 3 refs.*

Ethyl acetate causes narcotic effects. Maximum allowable concentrations in different countries vary from 200 to 1464 mg/cu m. The recommended MAC values for Czechoslovakia are 400 mg/cu m (mean) and 2000 mg/cu m (peak). The findings of several investigators are noted.

22828 APTIC NO. 41291

Fuchs, A.

FORMALDEHYDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 83-84, June 1969. 7 refs.*

Formaldehyde is an irritant. Maximum allowable concentrations in different countries range from 1 to 12 mg/cu m. The suggested MAC values for Czechoslovakia are 2 mg/cu m (mean) and 5 mg/cu m (peak). The findings of various investigators are noted.

22829 APTIC NO. 41305

Fuchs, A.

METHYLENE CHLORIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 118-120, June 1969. 10 refs.*

Methylene chloride is one of the least dangerous hydrocarbons, but can induce narcosis. Maximum allowable concentrations in different countries range from 20 to 1768 mg/cu m. The suggested MAC values for Czechoslovakia are 500 mg/cu m (mean) and 2500 mg/cu m (peak). The findings of various investigators are noted.

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APTIC NO. 41334

Fuchs, A.

N-PROPYL ACETATE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 139-140, June 1969. 3 refs.*

Complaints from n-propyl acetate exposure are limited to narcosis and irritation. Maximum allowable concentrations in different countries vary from 200 to 840 mg/cu m. The recommended MAC values for Czechoslovakia are (mean) 400 mg/cu m and (peak) 2000 mg/cu m. The findings of several investigators are noted.

22831

APTIC NO. 41339

Fuchs, A.

SULFUR TRIOXIDE AND SULFURIC ACID. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 148-150, June 1969. 6 refs.*

Sulfur trioxide and sulfuric acid have irritating effects. Maximum allowable concentrations in different countries vary from 1 to 26 mg/cu m. The suggested MAC values for Czechoslovakia are 1 mg/cu m (mean) and 2 mg/cu m (peak).

22832

APTIC NO. 41349

Fuchs, A. and Krivucova, M.

PHOSGENE (CARBONYL CHLORIDE). In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 131-133, June 1969. 8 refs.*

Phosgene can cause lung edema with a long period of latency. Low exposure can cause chronic, irreparable change. Maximum allowable concentrations in different countries vary from 0.4 to 2.0 mg/cu m. Increased care with the substance is recommended. The suggested MAC values for Czechoslovakia are (mean) 0.4 mg/cu m and (peak) 2.0 mg/cu m. The findings of several investigators are noted. 0

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APTIC NO. 41217

Huenigen, E. and W. Prietsch

MAXIMUM PERMISSIBLE CONTENT OF HARMFUL SUBSTANCES IN THE EXHAUST GASES OF AUTOMOBILE ENGINES. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, *Snizheniye Zagryaz. Vozdukha Gorodakh Vykhlopynny Gazami Avtomob. Proc. Symp., 2nd, 1971. 4 refs. Translated from Russian. 11p.*

Standards for the emission of toxic substances in exhaust gases should be established in accordance with three basic requirements: the method used to make the evaluation should reflect the actual share borne by the automobile in pollution; the test method should be simple; and emissions standards should ensure the maintenance of air quality at a level established in maximum allowable concentrations. Thus, European are driving cycle list data of carbon monoxide exhaust emissions should be analyzed systematically with results of air quality measurements to develop a basis for CO emission standards. Similar procedures should be followed for other pollutants. Present standards in effect in the German Democratic Republic are given and the emissions standards proposed in 1968 by the U.N. Economic Commission for Europe are evaluated.

22834

APTIC NO. 41253

Krivucova, M.

CHLOROFORM. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 52-53, June 1969. 6 refs.*

Chloroform is a narcotic which irritates slightly in industrial exposure, affects the heart muscle and liver, and induces subjective neurasthenic complaints in diverse forms. Maximum allowable concentrations in different countries range from 20 to

500 mg/cu m. The suggested MAC values for Czechoslovakia are 50 mg/cu m (mean) and 250 mg/cu m (peak). The findings of several investigators are noted.

22835

APTIC NO. 41259

Krivucova, M.

DICYKLOHEXYLAMINE NITRITE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 65, June 1969. 6 refs.*

The relation between concentration of dicyklohexylamine nitrite and its effect on man is not available in the literature. The substance does affect the nervous system. In animal experiments, paralysis and cramps are observed. The suggested maximum allowable concentrations for Czechoslovakia are 1.0 mg/cu m (mean) and 3.0 mg/cu m (peak).

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APTIC NO. 41304

Krivucova, M.

METHYL CHLORIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 116-117, June 1969. 4 refs.*

Methyl chloride induces narcosis, damages the central nervous system, liver, and kidney, and can affect blood formation. Maximum allowable concentration in different countries vary from 20 to 210 mg/cu m. The suggested MAC values for Czechoslovakia are 100 mg/cu m (mean) and 200 mg/cu m (peak).

22837

APTIC NO. 41734

Lieben, Jan

T.L.V.-M.A.C.-CEILING LIMITS--AMBIENT AIR QUALITY STANDARDS IN THE USA. *Pracovní Lekar. (Prague), 24(2-3):83-86, 1972. 7 refs.*

Threshold Limit Values for industrial exposure in the U. S. are time-weighted concentrations of pollutant hazards for the 7- to 8-hour work day and 40-hour work week designed to be used as guidelines and not as hard and fast rules. The Maximum Allowable Concentration is the amount that can be tolerated by man with no immediate or long-range impairment of health or well-being. These should be given as 8-hour averages not to be exceeded even momentarily. The Maximum Acceptable Concentration represents a concentration below which all values should fluctuate. Ceiling Values are designed for substances which are fast acting and are best controlled by a limit that should never be exceeded. The national primary ambient air quality standards should be based on these criteria and allow an adequate margin of safety. The objective is to provide an environment which will be healthful or at least not harmful to man, animals, and plants. It must be recognized that effects can range from negligible, through severe, acute, and chronic, to fatal. High exposures have uniform effects. As exposures get lower, individual factors take over, and responses differ. The groups effected become smaller until the one in 100,000 hypersusceptible person is reached. Standard setters are faced with the task of protecting the public, and finding a level of exposure which causes no irritation and still allows all segments of society to conduct their lives and businesses in a reasonably considerate and financially possible manner. A review of the history of standard setting and guidelines for uniform application of standards is included.

22838

APTIC NO. 41234

Marhold, J.

ALLYL ALCOHOL. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 5-6, June 1969. 3 refs.*

Allyl alcohol is a strongly irritating substance with good warning properties. Maximum allowable concentrations in different countries range from 2.0 to 12.0 mg/cu m. The suggested MAC values for Czechoslovakia are 3.0 mg/cu m (mean) and 6.0

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mg/cu m (peak). The findings of several investigators are noted.

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APTIC NO. 41235

Marhold, J.

AMMONIA. *In: Documentation of MAC in Czechoslovak Commission for MAC, Prague, p. 7-8, June 1969. 3 refs.*

Ammonia is an irritant with good warning properties. Maximum allowable concentrations in different countries range from 20 to 70 mg/cu m. The suggested MAC values for Czechoslovakia are 40 mg/cu m (mean) and 80 mg/cu m (peak). The findings of several investigators are noted.

22840

APTIC NO. 41237

Marhold, J.

AMYL ALCOHOL. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 11-12, June 1969. 4 refs.*

Amyl alcohol has irritant effects, inhibitive effects on the central nervous system, and causes damage to organs of blood circulation. It is more toxic than ethanol. Maximum allowable concentrations in different countries range from 100 to 366 mg/cu m. The suggested MAC values for Czechoslovakia are 100 mg/cu m (mean) and 200 mg/cu m (peak).

22841

APTIC NO. 41238

Marhold, J.

ANILINE. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 13-14, June 1969. 3 refs.*

Aniline causes cyanosis, liver damage, and anemia in acute poisoning. Maximum allowable concentrations in different countries range from 3 to 39 mg/cu m. Anemia is considered the critical effect. The suggested MAC values for Czechoslovakia are 5 mg/cu m (mean) and 25 mg/cu m (peak). The findings of several investigators are noted.

22842

APTIC NO. 41244

Marhold, J.

BUTYL ALCOHOL. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 27-28, June 1969. 4 refs.*

Butyl alcohol is an irritant effect and has an inhibiting effect on the central nervous system. There are only slight differences in toxicity of the individual isomers. Maximum allowable concentrations in different countries range from 150 to 300 mg/cu m. The suggested MAC values for Czechoslovakia are 100 mg/cu m (mean) and 200 mg/cu m (peak). The findings of several investigators are noted.

22843

APTIC NO. 41250

Marhold, J.

CHLORINATED DIPHENYLS. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 45-46, June 1969. 4 refs.*

The main danger from chlorinated diphenyls is of damage to the liver in chronic poisoning. The higher the chlorine percentage, the greater is the toxicity in the liver. Maximum allowable concentrations in different countries range from 0.5 to 1.0 mg/cu m. The suggested MAC values for Czechoslovakia are, for 42% chlorine, 1.0 mg/cu m (mean) and 2.0 mg/cu m (peak), and for 54% chlorine, 0.5 mg/cu m (mean) and 1.0 mg/cu m (peak). The findings of several investigators are noted.

22844

APTIC NO. 41262

Marhold, J.

DINITROBENZENE. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 70, June 1969. 1 ref.*

AIR POLLUTION ABSTRACTS, SEPTEMBER 1972

There are no data available on the relation between dinitrobenzene vapor concentrations and effects on man. Hepatotoxic effects and retinitis are described as a sequel to poisoning. The compound is well absorbed in the skin. The maximum allowable concentration in several countries is 1 mg/cu m. Anemia is considered a critical effect. The suggested MAC values for Czechoslovakia are 1 mg/cu m (mean) and 5 mg/cu m (peak).

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APTIC NO. 41263

Marhold, J.

DINITROCHLOROBENZENE. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 71, June 1969. 1 ref.*

The symptoms of acute poisoning by dinitrochlorobenzene is methemoglobinemia. Dinitrochlorobenzene irritates the skin directly. The maximum allowable concentration in several countries is 1 mg/cu m. Eczema is considered the critical effect. The suggested MAC values for Czechoslovakia are 1 mg/cu m (mean) and 5 mg/cu m (peak).

22846

APTIC NO. 41265

Marhold, J.

ETHYL ALCOHOL. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 74-75, June 1969. 4 refs.*

The effect of ethyl alcohol on the central nervous system depends upon the alcohol level in the blood which is connected with metabolism and work stress. Maximum allowable concentrations in different countries range from 1000 to 1900 mg/cu m. The suggested MAC values for Czechoslovakia are 1000 mg/cu m (mean) and 5000 mg/cu m (peak). The findings of several investigators are noted.

22847

APTIC NO. 41293

Marhold, J.

HYDROGEN CHLORIDE. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 89-90, June 1969. 5 refs.*

Hydrogen chloride is an irritant with good warning properties. Maximum allowable concentrations in different countries range from 5 to 15 mg/cu m. The suggested MAC values for Czechoslovakia are 8 mg/cu m (mean) and 16 mg/cu m (peak). The findings of several investigators are noted.

22848

APTIC NO. 41299

Marhold, J.

MALEIC ANHYDRIDE. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 105, June 1969. 2 refs.*

Maleic anhydride is considered toxicologically similar to phthalic anhydride. It may cause allergic disease. The suggested maximum allowable concentrations for Czechoslovakia are 1 mg/cu m (mean) and 5 mg/cu m (peak).

22849

APTIC NO. 41303

Marhold, J.

METHYL ALCOHOL. *In: Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 114-115, June 1969. 4 refs.*

Methanol has an irritant effect and inhibits the central nervous system. Maximum allowable concentrations in different countries varied from 50 to 260 mg/cu m. The suggested MAC values for Czechoslovakia are 100 mg/cu m (mean) and 500 mg/cu m (peak). The findings of several investigators are noted.

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APTIC NO. 41306

Marhold, J.

NITROBENZENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 121-122, June 1969. 4 refs.*

Chronic poisoning from nitrobenzene apparently involves anemia, hemolytic icterus, and pseudoneurasthema. Maximum allowable concentrations in different countries vary from 3 to 5 mg/cu m. The suggested MAC values for Czechoslovakia are 5 mg/cu m (mean) and 25 mg/cu m (peak). The findings of several investigators are noted.

22851

APTIC NO. 41307

Marhold, J.

NITROCHLOROBENZENE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 123, June 1969. 2 refs.*

Nitrochlorobenzene may induce allergic disease. The maximum allowable concentration in different countries is 1 mg/cu m. The suggested MAC values for Czechoslovakia are 1 mg/cu m (mean) and 5 mg/cu m (peak).

22852

APTIC NO. 41333

Marhold, J.

PHTHALIC ANHYDRIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 138, June 1969. 1 ref.*

Phthalic anhydride can cause stomach distress and irritation of mucous membranes and skin from contact with its vapors. Maximum allowable concentrations in different countries vary from 1 to 30 mg/cu m. The suggested MAC values for Czechoslovakia are (mean) 5 mg/cu m and (peak) 20 mg/cu m.

22853

APTIC NO. 41335

Marhold, J.

PROPYL ALCOHOL. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 141-142, June 1969. 3 refs.*

Propyl alcohol has an inhibiting effect on the central nervous system and irritant effects. At 1.5% propyl alcohol in the blood, man is unconscious. Maximum allowable concentrations in different countries vary from 200 to 2000 mg/cu m. The recommended MAC values for Czechoslovakia are (mean) 500 mg/cu m and (peak) 1000 mg/cu m.

22854

APTIC NO. 41338

Marhold, J.

SULFUR DIOXIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 146-147, June 1969. 5 refs.*

Sulfur dioxide is an irritating substance with good warning properties. Maximum allowable concentrations vary from 1 to 13 mg/cu m in different countries. The suggested values for Czechoslovakia are 10 mg/cu m (mean) and 50 mg/cu m (peak). The findings of several investigators are noted.

22855

APTIC NO. 41246

Mestitzova, M.

CARBON DIOXIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 32-35, June 1969. 12 refs.*

In high concentrations carbon dioxide inhibits breathing, is slightly narcotic from concentrations of 54,000 mg/cu m, increases blood pressure and pulse, and decreases hearing. Very high concentrations cause death from oxygen insufficiency. Maximum allowable concentrations in different countries range from 9,000 to 9,155 mg/cu m. The suggested MAC values for Czechoslovakia are 9,000 mg/cu m (mean) and

45,000 mg/cu m (peak). The findings of various investigators are noted.

22856

APTIC NO. 41255

Mestitzova, M.

CHROMIUM AND ITS SALTS. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 50-58, June 1969. 12 refs.*

Chromium is an irritant causing perforation of the nasal septum, eczema, and allergy. Chronic effects include headache, emaciation, and an inclination to inflammatory and ulcerous diseases of the digestive tract and pneumonia. The maximum allowable concentration in several countries is 0.1 mg/cu m. The suggested MAC values for Czechoslovakia are 0.05 mg/cu m (mean) and 0.10 mg/cu m (peak). The findings of several investigators are noted.

22857

APTIC NO. 41266

Mestitzova, M.

FLUORIDES (AS HF). In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 76-80, June 1969. 21 refs.*

Fluorides are less active than gaseous or liquid compounds of fluorine. Soluble salts are more toxic. The fluoride ion is a protoplasmic poison. Effects of chronic poisoning are anemia, fragility of bones, and dental changes. Maximum allowable concentrations in different countries range from 1.0 to 2.5 mg/cu m. The suggested MAC values for Czechoslovakia are 1 mg/cu m (mean) and 2 mg/cu m (peak). The findings of various investigators are noted.

22858

APTIC NO. 41267

Mestitzova, M.

FLUORINE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 81-82, June 1969. 4 refs.*

Fluorine causes severe skin irritation and, when inhaled, causes lung edema. Maximum allowable concentrations in different countries range from 0.05 to 0.4 mg/cu m. The suggested MAC values for Czechoslovakia are 0.2 mg/cu m (mean) and 0.4 mg/cu m (peak). The findings of several investigators are noted.

22859

APTIC NO. 41295

Mestitzova, M.

HYDROGEN FLUORIDE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 93-95, June 1969. 11 refs.*

Hydrogen fluoride has an irritating effect on mucosa, the breathing tract, and the skin. Adaptation to short-term exposure does not occur. There is also increased fluorine excretion in the urine. Maximum allowable concentrations in different countries range from 0.5 to 2.0 mg/cu m. The suggested MAC values for Czechoslovakia are 1.0 mg/cu m (mean) and 2.0 mg/cu m (peak). The findings of various investigators are noted.

22860

APTIC NO. 41312

Mestitzova, M.

PHOSPHINE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 134-135, June 1969. 6 refs.*

Acute poisoning by phosphine causes inhibition of the central nervous system and lung irritation. Death may result. Symptoms include fainting, nausea, vomiting, diarrhea, thorax pain, and emphysema. Maximum allowable concentrations in different countries vary from 0.1 to 0.40 mg/cu m. The suggested MAC values for Czechoslovakia are (mean), 0.10 mg/cu m and (peak), 0.20 mg/cu m, since phosphine is a very strong poison. The findings of several investigators are noted.

22861

APTIC NO. 41332

Mestitzova, M.

PHOSPHORUS (YELLOW). In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 136-137, June 1969. 4 refs.*

Phosphorus is a parenchymatous poison which affects the nervous and circulatory systems by inhibiting intracellular oxidation. Symptoms of acute poisoning include stomach ache, vomiting, diarrhea, vertigo, and weak heart activity. Anemia and chronic exhaustion result from chronic poisoning. Maximum allowable concentrations in different countries vary from 0.03 to 0.1 mg/cu m. The suggested MAC values for Czechoslovakia are mean 0.03 mg/cu m and peak 0.06 mg/cu m. The findings of several investigators are noted.

22862

APTIC NO. 41682

Ryazanov, V. A. (ed.)

MAXIMUM PERMISSIBLE CONCENTRATIONS OF NOXIOUS SUBSTANCES IN THE ATMOSPHERIC AIR OF POPULATED AREAS. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Second Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants. M. Y. Nuttonson (ed.), Vol. 11, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 1-3. Translated from Russian. (Also Izv. Akad. Med. Nauk SSSR, vol. 11:201-204, 1968.)*

NTIS: PB 209478

The maximum allowable concentrations approved by the Assistant Chief Public Health Physician of the USSR are listed. Maximum single and mean daily concentrations of 94 noxious substances are presented, including standards for nitrogen dioxide, aldehydes, aromatic and aliphatic hydrocarbons, ketones, ammonia, organic nitrogen compounds, alcohols, phosphorus compounds, organic and inorganic acids, vanadium compounds, sulfur and organic sulfur compounds, manganese compounds, cyanates, arsenic compounds, chlorinated hydrocarbons, mercury compounds, soot, lead compounds, nontoxic dusts, sulfur dioxide, carbon monoxide, fluorine compounds, chlorine compounds, gasoline, and chromium compounds. Concentration limits for specific combinations of substances are also described.

22863

APTIC NO. 41269

Sachse, I. and E. Huenigen

EXPERIENCE IN THE INTRODUCTION OF STANDARDS FOR MEASURING AND LIMITING THE SMOKING OF AUTOMOBILE DIESEL ENGINES. Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdukh Gorodakh Vykhlopynmy Gazami Avtomob. Proc. Symp., 2nd, 1971. 1 ref. Translated from Russian. 6p.

The general contents of 1969 legislation establishing smoke density limits for diesel-engined vehicles in the German Democratic Republic was enacted are described. Measurements have shown that modern diesel engines when properly adjusted can meet the norms set forth in the standard. Tightening of adjustment tolerances for mass production results in a very significant reduction in diesel engine smoking. Smoke density can also be used as a criterion for testing and approving new engine models.

22864

APTIC NO. 41239

Teisinger, J.

ARSENIC. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 15-16, June 1969. 8 refs.*

Arsenic has a necrotizing effect on the skin and mucosa, may damage nervous tissue, and has cancerogenic effects. Maximum allowable concentrations in different countries range from 0.15 to 0.5 mg/cu m. The suggested MAC values for

Czechoslovakia are 0.3 mg/cu m (mean) and 1.5 mg/cu m (peak). The findings of several investigators are noted.

22865

APTIC NO. 41240

Teisinger, J.

ARSINE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 17-18, June 1969. 4 refs.*

Arsine has been observed to cause serious poisoning and can be lethal in high concentrations. Maximum allowable concentrations in different countries range from 0.2 to 1.6 mg/cu m. The suggested MAC values for Czechoslovakia are 0.2 mg/cu m (mean) and 1.0 mg/cu m (peak). The findings of several investigators are noted.

22866

APTIC NO. 41256

Teisinger, J.

COBALT (POWDER AND METAL FUMES). In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 59-60, June 1969. 6 refs.*

Cobalt causes significant damage to lung tissue and excessive sensitivity of the skin. Maximum allowable concentrations in different countries range from 0.1 to 0.5 mg/cu m. The suggested MAC values for Czechoslovakia are 0.1 mg/cu m (mean) and 0.5 mg/cu m (peak). The findings of various investigators are noted.

22867

APTIC NO. 41300

Teisinger, J.

MANGANESE. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 106-107, June 1969. 7 refs.*

Manganese affects the nervous system. Maximum allowable concentrations in different countries vary from 0.3 to 6.0 mg/cu m. The suggested MAC values for Czechoslovakia are 2 mg/cu m (mean) and 10 mg/cu m (peak). The findings of several investigators are noted.

22868

APTIC NO. 41301

Teisinger, J. and Krivucova, M.

MERCURY. In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 108-111, June 1969. 16 refs.*

Mercury is a poison which damages the nervous system and can cause psychic disturbances in advanced stages of damage of the parenchymatous organs and the digestive tract. Early symptoms include inflammation of the oral and nasal mucous membrane. Maximum allowable concentrations in different countries range from 0.01 to 0.1 mg/cu m. The suggested MAC values for Czechoslovakia are 0.05 mg/cu m (mean) and 0.25 mg/cu m (peak). The findings of various investigators are noted.

22869

APTIC NO. 41342

Teisinger, J. and Vlachova

TOLUENE. In: *Documentation of MAC of Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 155-157, June 1969. 10 refs.*

Toluene is an irritant of the mucous membranes. Other symptoms of toluene poisoning include headache, lack of appetite, anemia, and disturbance in coordination. The narcotic effect is increased by the presence of benzene. Maximum allowable concentrations in different countries vary from 50 to 750 mg/cu m. The suggested MAC values for Czechoslovakia are 200 mg/cu m (mean) and 1000 mg/cu m (peak). The findings of various investigators are noted.

22870

APTIC NO. 41348

Teisinger, J.

ZINC OXIDE (FUME). In: *Documentation of MAC in Czechoslovakia. Czechoslovak Commission for MAC, Prague, p. 166-167, June 1969. 6 refs.*

Maximum allowable concentrations in different countries for zinc oxide fumes vary from 5 to 15 mg/cu m. Suggested MAC values for Czechoslovakia are, mean, 5 mg/cu m and peak, 25 mg/cu m. With these values no symptoms of illness should appear. The findings of several investigators are noted.

LEGAL AND ADMINISTRATIVE

22871

APTIC NO. 40995

ACCEPTABLE AIR QUALITY NOW WITHIN VIEW. MOTOR VEHICLE CONTROL OF NOX: AN ESSENTIAL STEP. *APCD (Air Pollut. Control Dist.) Dig. 2:5:4, May 1972.*

In recent years, oxides of nitrogen have increased substantially in the Los Angeles area. The decrease in the early sixties of this pollutant reflects the control actions taken by the Los Angeles County Air Pollution Control District on the fuels combustion problem. The increase after 1966 reflects the adverse effect on nitrogen oxides emissions resulting from the control systems selected by the automobile manufacturers to control hydrocarbon and carbon monoxide exhaust emissions. California has since required controls for oxides of nitrogen for all new motor vehicles beginning in 1971. This and additional actions are expected to influence a downward trend in emissions levels. There is concern, however, that the Federal Environmental Protection Agency will not continue to grant California the waivers necessary to continue its own motor vehicle emission control program. Federal exhaust emission standards for carbon monoxide for 1975 and later motor vehicles are more stringent than those in California; however, California standards for nitrogen oxides emissions are approximately 50% more stringent than the proposed federal levels.

22872

APTIC NO. 41013

Iwate Prefecture (Japan)

BASIC PLANNING FOR PUBLIC NUISANCE PREVENTION IN IWATE PREFECTURE. (*Iwateken kogai boshi kikon kenkaku*). Text in Japanese. 45p., 1971.

The particulate concentration decreased and sulfur oxides concentration increased in Iwate Prefecture from 1965 due to the change of fuel from coal to heavy oil. In recent years, the production scales have grown and the particulate concentration has increased. The sulfur oxides concentration has been almost constant. The complaints on air pollution increased from 10 in 1969 to 36 in 1970. More than 1000 factories and 5000 facilities were registered as polluters according to the newly revised regulations issued in June 1971. The complaints on offensive odors increased from 16 in 1969 to 67 in 1970. Since no regulation has been established for the control of odors, a plan was set to reach a goal that the odors would be diminished to a level that the majority of the residents would not be conscious of their existence.

22873

APTIC NO. 41034

Economic Planning Agency (Japan) Study Committee for Environmental Problems

REPORT OF THE SPECIAL COMMITTEE FOR ENVIRONMENTAL POLLUTION. (*Kankyo osen kenkyu senmon inkai hokokusho*). Text in Japanese. 93p. March 1972.

The increases of energy consumption, the rapid development of heavy chemical industries, and the rapid growth of automobile industries has caused severe air pollution in recent years.

In this country, pollution control has been focused on the sulfur oxide concentration, however, pollution by automotive exhaust gas in large cities has become more and more serious. It is estimated that 155,000,000 kl of fuel will be needed in 1978, and in order to keep the sulfur oxide concentration at a 99% hourly value of 0.2 ppm, fuel with a sulfur content less than 0.80% will be needed. The total exhaust gas in 1975 will reach 2,000,000 cu m. Control of air pollution is preceded by plans for completely equipping the detection net, lowering the sulfur content of fuel, desulfurization of flue gas, diffusion and dilution of gas by a high stack policy, and control of particulates.

22874

APTIC NO. 41093

FEDERAL GUIDELINES ARE AIMED AT HELPING FIRMS MEET RULES. *Can. Pulp Paper Ind. (Vancouver), 25(5):27, 29, May 1972.*

Environment Canada is bringing out a set of guidelines that will assist pulp and paper companies and regulatory agencies with the implementation of the federal government's new effluent regulations. The Environmental Protection Service of the department is taking on the job of carrying promising new pollution control technology beyond the research stage to practical demonstration. The intent is to encourage recovery at the source by treating to practicable levels. The guidelines will go into somewhat more detail than was possible in the regulations themselves with respect to how the standards should be calculated for each mill and how they are intended to be implemented. One aspect of the regulations is that they specify limits not just for the plant as a whole but for each step or processing unit within it.

22875

APTIC NO. 41204

Mexico Secretariat of Health and Welfare

FEDERAL LAW FOR THE PREVENTION AND CONTROL OF ENVIRONMENTAL POLLUTION. REGULATIONS FOR THE PREVENTION AND CONTROL OF AIR CONTAMINATIONS CAUSED BY SMOKE AND DUST EMISSIONS. (*Ley federal para prevenir y controlar la contaminacion ambiental. Reglamento para la prevencion y control de la contaminacion atmosferica originada por la emision de humos y polvos. Diario Oficial (Mexico) March 23, 1971 and Sept. 17, 1971. Translated from Spanish. Translation Consultants Inc., Arlington, Va., 40p.*

The discharge of pollutants detrimental to human health, plants, and wildlife is prohibited. Sources of pollution are listed, including stationary source mobile sources, and mixed sources such as incineration. Water and soil pollution are also controlled by the law. Penalties involving fines and closures of facilities are established. A separate regulation enacts specific dust and smoke emission standards.

22876

APTIC NO. 41230

TRW Systems Group, McLean, Va., Washington Operations

PROPOSED CONTROL STRATEGY FOR THE STATE OF ALABAMA. *Office of Air Programs Contract 68-02-0048, APTD 0871. 14p., Nov. 1971. 1 ref.*

NTIS PB 205252

The pollutants to be controlled by the proposed control strategy are divided into two sets, Set 1 consisting of particulate matter and sulfur oxides and Set 2 consisting of carbon monoxide, nitrogen oxides, hydrocarbons, and photochemical oxidants. To provide a basis for the degree of control to be applied, the concept of Class 1 and 2 counties was developed in which less stringent control for the Set 1 pollutants are required in the Class 2 counties. The county classification criteria are based on the existing pollutant problems and the urban or rural nature of the county. Since the national standards applicable to the Set 2 pollutants cannot be met by 1975, the most stringent stationary source controls feasible have been applied to these pollutants for both Class 1 and Class 2

counties. The adequacy of the proposed control strategy is demonstrated through use of a rollback technique for selected regions which compares the percent emission reduction achieved as a result of the strategy application to the percent emission reduction required. It is anticipated that, with the exception of carbon monoxide and hydrocarbons, the applicable national standards will not be exceeded by or after 1975. Carbon monoxide and hydrocarbons are expected to conform by 1977. The legal enforcement authority for the plan is described. The existing emissions inventory summary for each county in the state is provided, as well as the anticipated emissions inventories for each county after the strategy application. Major sources include domestic heating, coal, oil, and natural gas use, open burning, incineration, solvent evaporation, ships, railroads, diesel engines, power plants, and automobiles.

22877

APTIC NO. 41289

Bonner and Moore Associates, Inc., Houston, Tex.

TAX SYSTEMS TO SUPPORT REDUCTION OF LEAD CONTENT IN MOTOR GASOLINES. *Environmental Protection Agency Contract 68-02-0050-3, 72p., July 29, 1971. 2 refs.*

NTIS: PB 203953

Four lead content reduction schedules were selected from a previously conducted added cost study for further analysis to explore the use of taxation as an implementation device. Differences between the schedules provide for removal of lead from conventional 94 octane and 100-octane grades at different rates over a 10 year period. The basic role of taxation is to raise the price of leaded gasoline so that the price of the unleaded or low-leaded gasoline is competitive with the leaded regular. This taxation can take the form either of a per-gallon tax on fuel containing lead, a flat tax per pound of lead used in gasoline additive, or a combination of the two. The least demanding reduction schedule can be met only through the use of a cent-per-gallon tax on gasoline. This method would increase taxes for the leaded grades and all grades equal to or greater than 94 octane while decreasing the tax on the new third grade 93-octane grade. The more demanding schedules are most effectively met through a direct tax on lead additives. Lead is taxed, and an excise tax credit of one-half cent/gal is allowed on all unleaded gasoline below conventional regular octane. Regulation on lead levels would be required if a gasoline tax is used to implement these schedules. Results of imposing all three tax methods are described in detail.

22878

APTIC NO. 41355

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WHICH FIGHTS AIR POLLUTION. (*Taiki usen to tatakan beikoku kankyo hego choi. Kagaku Keizai (Chem. Ind. Econ.), 1972 61-62, Feb. 1972. Translated from Japanese. 13p.*)

An interview between J. P. DeKany of the U. S. Environmental Protection Agency and Junpei Ando, Professor of Engineering at Chuo University in Japan, is presented. At the present time the most important pollutants in the U. S. are sulfur dioxide, nitrogen oxides, suspended dusts, hydrocarbons, carbon monoxide, and oxidants. The EPA has established uniform environmental standards throughout the U. S. for these six pollutants; the country has been divided into 250 regions to attain these standards. Since environmental problems must be approached on the basis of mutual cooperation between federal, state, and city governments, the EPA acts as the center for cooperation between these elements. In developing new control techniques, the Agency sometimes participates at the basic research stage. Private industry also develops techniques, and there are instances where the government provides assistance in the construction of large-scale demonstration plants. In the 1971 fiscal year, the total spent for air pollution was \$28 million, with private enterprises spending about \$10 million. Control of SO₂ pollution has emphasized smoke

desulfurization. The next stage will probably be desulfurization in the petroleum refining process or coal gas conversion stages. The need for international cooperation in dealing with air pollution problems is also discussed.

22879

APTIC NO. 41450

Association of Public Health Inspectors, London (England), General Council

LOCAL GOVERNMENT REORGANISATION AND ENVIRONMENTAL HEALTH. *Environ. Health, 79(11):423, 438-448, Nov. 1971.*

The reorganization of the Public Health Services for England, Wales, Scotland, and Northern Ireland will take place at the same time as the reorganization of their local governments. The responsibility for air pollution control should remain with the district councils because of the local nature of the offences and because of the vast experience accrued by the district officials from handling air pollution problems in the past.

22880

APTIC NO. 41473

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

GUIDE FOR AIR POLLUTION EPISODE AVOIDANCE. *PHS Contract PH-22-68-32, OAP Pub-AP-76, 141p., Sept. 1971. 85 refs.*

GPO: 5503-0014

Planning for episode avoidance entails gathering of information on atmospheric conditions and sources of emissions, establishment of alert criteria, a responsible organization with authority for source curtailment, and development of communications and Emergency Action Plan procedures. Pollutants, their sources and effects and inventory procedures are discussed. Various emergency action strategies are described, as well as the legal, social, and financial implications of those measures. The planning of Emergency Action Centers and aspects of episode meteorology are also presented. Public information and education are discussed.

22881

APTIC NO. 41483

Council of the European Communities

EXCERPTS FROM OFFICIAL JOURNAL OF THE EUROPEAN COMMUNITIES. *J. Off. Communautés Eur. 151 761, April 6, 1970. 7 refs. Translated from French. Translation Consultants, Inc., Arlington, Va., 61p.*

Legislative actions of the member states of the European Economic Community with regard to abatement of pollution due to gases emitted by controlled ignition engines are delineated. Regulations are reviewed for vehicle definition, request for certification, testing for carbon monoxide and hydrocarbon emissions under specified engine operating cycles and in various traffic conditions, measurement procedures, sampling and analysis, fuel consumption and content, and fuel tanks.

22882

APTIC NO. 41629

Japan Chamber of Commerce and Industry Industrial Pollution Consultation Report

REPORT FROM THE INDUSTRIAL POLLUTION CONSULTATION ROOM. (*Sangyo kogai sodanshitsu ryoku hokokusho (showa) 1-over 1 gatsui. Text in Japanese. 42 p., April 1972.*)

Five hundred and ninety cases of public nuisance problems including air pollution, water pollution, and noise pollution were presented in 27 consultation offices throughout Japan. Another 43 cases were consulted at 10 companies. Many seminars and conferences were also held. The questions included techniques and regulations on pollution control, for instance, the use of dust collectors and the calculation of sulfur dioxide concentration in flue gas.

LEGAL AND ADMINISTRATIVE

22888

22883

APTIC NO. 41632

Toyama Prefectural Board of Education (Japan)

MATERIALS FOR EDUCATIONAL PLANS RELATING TO ENVIRONMENTAL POLLUTION PROBLEMS.
(*Kogai ni kansuru shido snako shiryo*). Text in Japanese. 177p., Oct. 1971.

Instructional material for elementary schools and junior and senior high schools concerning public nuisance were compiled in Toyama Prefecture. Instructional material includes course plans for sociology, science, hygiene, and athletics. General viewpoint, some pointers, and sample lessons are given. As reference material to be used in conjunction with the instructional materials, reports, articles, public nuisance laws and ordinances, explanations of the administrative organizations of the Toyama Prefectural air pollution system, outstanding public nuisance episodes, pollution countermeasures, and commentaries are given. Appendices include maps, chronological tables, a bibliography, and a glossary of public nuisance terms. Data concerning air pollution include the trends in settling particles, sulfur dioxide concentrations, sulfur dioxide emissions, and crude oil consumption in the Prefecture between 1965 and 1970, wind direction frequency in various locations in the Prefecture, the growth in the number of automobiles in the Prefecture, the air pollution monitoring network of Toyama Prefecture, and the locations of continuous monitoring stations in the Prefecture.

22884

APTIC NO. 41661

Environmental Protection Agency. Research Triangle Park, N. C., Office of Air Programs

GUIDE FOR CONTROL OF AIR POLLUTION EPISODES IN MEDIUM SIZED URBAN AREAS. PHS Contract PH-22-68-72, Pub-AP-77, 60p., June 1971.
GPO: 5503-0013

A manual for local air pollution officials suggests guidelines for the design and implementation of emergency plans during an air pollution emergency. Episodic rather than long-range plans are emphasized. Man-made accidental episodes are not considered specifically, but some of the general principles outlined may often be applied. Detailed technical and legal considerations have been excluded, but moderately sophisticated plans are proposed for cities with population between 30,000 and 300,000. Plans detail how a handful of trained personnel can implement effective episode emergency action. Atmospheric pollutants effecting episodes are particulates, sulfur oxides, carbon monoxide, oxidants, oxides of nitrogen, and other pollutants. Air quality forecasting is done by several advisory agencies using meteorological and air quality monitoring data. Communications, public information, and socio economic factors are discussed.

22885

APTIC NO. 41795

Environmental Protection Agency, Washington, D. C.

TITLE 40 -- PROTECTION OF ENVIRONMENT.
CHAPTER 1 -- ENVIRONMENTAL PROTECTION
AGENCY SUBCHAPTER C -- AIR PROGRAMS. PART
52 -- APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register*, 37 (105), Part III, 10842-10909, May 31, 1972.

All 50 states, plus the District of Columbia, Puerto Rico, Virgin Islands, Guam, and American Samoa have submitted plans for implementing national air quality standards. Approvals and disapprovals by the Administrator of the Environmental Protection Agency are set forth with regard to the following parts of each state implementation plan: public availability of emission data, legal authority, control strategies, rules and regulations, compliance schedules, review of new sources and modifications, prevention of air pollution emergency episodes, source surveillance, and air quality surveillance systems. The air quality control regions of each state are assigned priorities for particulate matter, sulfur oxides, nitrogen dioxide, carbon

monoxide, and photochemical oxidants. The determination of the Administrator with respect to requests for deadline extensions are set forth.

22886

APTIC NO. 42011

CONCERNING THE DRAFT OF A FEDERAL EMISSION LAW. (*Zum Entwurf eines Bundesimmissionsschutz-Gesetzes*). Text in German. Chem. Ind. (Duesseldorf), 24(5):271-272, May 1972.

The main air polluters in the Federal Republic of Germany are traffic (60%), industry (18%), and power generating plants and domestic heating (19%). A federal emission law should provide for the regulation of all air polluters, the establishing of uniform technical requirements for all emitters, and the prescription of uniform measuring methods and control instructions. However, the governmental draft does not create a uniform emission protection law. While for industrial plants it requires official authorizations for the construction and operation of equipment, it does not contain any regulations at all concerning the traffic sector. The emission protection regulations concerning traffic are directly added to the individual traffic regulations. Considering the mentioned facts, a revision of the planned emission protection law seems to be needed.

22887

APTIC NO. 42016

THE REDUCTION OF THE ADMISSIBLE LEAD CONTENT IN GASOLINES. (*Zur Herabsetzung des zulassigen Bleianteils in Kraftstoffen*). Text in German. Metall (Berlin), 26(5):495-496, May 1972.

The law passed singly and isolatedly by the Government of the Federal Republic of Germany limiting the lead content of fuels might have unfavorable consequences for free trade within the European community. The mineral oil industry and automobile industry of the other member states will be forced to a special production of gasolines and cars for the German market. This will be a burden to the industries of the member states rather than for the German industry. The Commission thinks that environmental protection is of vital interest for the entire Community, but all measures taken should be in due proportion. The differences in the opinion of experts is an indication that not much is known to date about the harmfulness of lead and the aromatics used to replace the lead. Single acts on the national level are detrimental to the Community and enhance the difficulties faced by the Community in its strive to arrive at a uniform policy in the field of environmental pollution. The Community is sponsoring a study program which should lead to the issuance of emission standards fit for all member states.

22888

APTIC NO. 42021

Japan Environmental Agency

WHITE PAPER ON ENVIRONMENT - A NEW GOAL FOR ENVIRONMENTAL POLICY. (*Showa 47 nenban kankyo hakusho, kankyo seisaku no atarashii zaihyo*). Text in Japanese. 486p., June 1972.

The present status of air pollution in Japan and the control policy of public nuisance is discussed. Forty major cities have higher sulfur oxide concentrations than standard values, as high as 10% of the cities subjected to investigation. In addition to SOx, other pollutants such as hydrogen fluoride, chlorine, and hydrogen chloride have complicated the pollution problem. The injuries to human health, such as chronic bronchitis, and damages to agricultural products and forests have become more and more significant. According to the new regulations passed on Jan. 11, 1972, the hourly average particulate concentration for 24 continuous hours must be less than 0.10 mg/cu m, and hourly concentration must not exceed 0.20 mg/cu m. New SOx standards are revised for different districts, and emergency threshold values of all pollutants are also listed. In the nation, 85,487 facilities have been registered as smoke and soot polluters. Restrictions on automobile exhausts have been tightened, and wide district observation systems were established.

22889

APTIC NO. 42023

GETTING TOGETHER FOR SOLUTIONS OF WORLD S POLLUTION PROBLEMS. *Chem. Week*, 111(1):32-33, July 5, 1972. 1 ref.

The United Nations Conference on the Human Environment made a number of recommendations which are expected to have an important impact on world environment problems. Among the recommendations made at the conference were the development of an international registry of chemicals in the environment, limitations on ocean discharge of wastes, and compensation for countries that lost export business because product costs are increased by pollution control. All of the conference reports will be forwarded to the UN General Assembly, where nations that boycotted the two-week meeting will have an opportunity to discuss them. One recommendation that is expected to gain quick UN General Assembly approval is the establishment of administrative machinery to coordinate the worldwide environmental efforts of governments and international agencies, eliminating overlap and encouraging new programs where needed. The conference reached agreement on a 26-point declaration of principle; a 200 point action program that includes monitoring climate changes and ocean pollution, promoting birth control, and the preservation of vanishing plant and animal species; and establishment of an environmental fund to cover that part of the international effort not paid for by special UN agencies and national governments. The U. S. delegation at the conference fought unsuccessfully the recommendation that the UN sponsor a study of methods by which developing nations could increase the output of natural materials.

22890

APTIC NO. 42041

THE ELIMINATION OF LEAD FROM LEAD-CONTAINING BENZENE. *Protectio Vitae*, 1972 89, 1972.

After a short transitional period to allow process modifications, the lead concentrations in benzene should be reduced. The ultimate goal should be the complete elimination of lead as soon as possible. Structural motor modifications should be started immediately. The quantity of lead in benzene should be taxed. The exhibition and storage of unpacked foodstuffs near motor roads must be prohibited. The use of leaded benzene in dry cleaning should be prohibited. Feasibility studies of replacement of leaded benzene with other fuels or of the replacement of lead with other additives are needed. Effective use must be made of present facilities to determine lead levels in the environment. Studies concerning the epidemiology of acute, chronic, and latent lead poisoning are necessary in order to establish the limits of admissible lead content in the environment, the biosphere, and the human organism.

22891

APTIC NO. 42058

LEGAL DICTUM AND MINING ADMINISTRATION. (*Aus Rechtsprechung und Bergverwaltung Text in German Glueckauf (Essen)*, 108(1):547-548, Jan. 1972.

The supreme court of administration in the Federal Republic of Germany ruled that the new emission protection law does not infringe on the right of free enterprise. Under the law an enterprise can be forced to move to another location, provided there is a possibility to avoid pollution. The law does not entail the restriction or prohibition of the operation at large. For instance, in a quarry which needs an explosive for blasting the use of an explosive cannot be prohibited, only the mode of operation can be regulated according to the law. 0

22892

APTIC NO. 42141

VAUN NEWILL. *Environ. Sci. Technol.*, 6(7):589-590, July 1972.

Vaun Newill, the federal ambassador serving as liaison between the health community and the Environmental Protection Agency, presents the activities of the federal agency involved in protecting the health of American citizens and the American environmental quality. As a national policy, the newest clean air law declared that the protection of the health

of American citizens must be assured regardless of economic costs. If approved, \$12 million will be spent on the federal air pollution program in 1973. The air health research program is divided in three disciplines: epidemiology, clinical research, and toxicology. The clinical research program, located on the University of North Carolina campus, investigates human exposure to pollutants and measures very fine physiological parameters. A total of 38 air pollutants will be considered for air pollution control actions.

22893

APTIC NO. 42195

Baumann, Jürgen

ENVIRONMENT POLLUTION IS NOT AN UNIMPORTANT DELICT. (*Umweltverschmutzung ist kein Kavaliersdelikt*). Text in German. *Umwelt (Düsseldorf)*, 2(3):36-45, June/July 1972. 34 refs.

An alternative to the reformation of the penal code with regard to environment pollution is presented. Environment pollution is regarded as an offense against the law which is contrary to the order and does not regard the penal code at all. Environment pollution offenses should be integrated into the penal code, since they may cause damages to human health and endanger the society on the whole. Only light delicts of environment pollution should be treated as contrary to order and penalized by fines. The alternative draft provides for a punishment of up to three years of prison for someone who pollutes the air by means of technical equipment and devices to an extent which exceeds the tolerances given by official control centers. Based on the addition by technical equipment and devices, only large polluters would be subject to judgments, while small polluters would be regarded as contrary to order and penalized by fines.

22894

APTIC NO. 41995

Beman, Robert H.

MARYLAND'S STATE AND LOCAL AIR QUALITY CONTROL AGENCIES ROUTINE COMPREHENSIVE AIR MONITORING SYSTEM. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet.*, 2nd, Edgewood Arsenal, Md., 1971, p. 123-130 (March 24-25).

NTIS, DDC: AD 729929

The combined State and local air monitoring network has been designated the Routine Comprehensive Air Monitoring System. Air monitoring in the State of Maryland will consist of 10 continuous monitoring stations, various types of manually operated stations, and a new automated telemetered system known as the Airmon system. The continuous monitoring systems measure sulfur dioxide, carbon monoxide, total hydrocarbons, wind speed and direction, dew point, air temperature, and soiling index. Data acquisition is handled by a hard wired digital paper tape recording system. Periodically, tapes are cut and transferred to a local agency headquarters for hard copy printout. Paper tapes and validation instructions are then converted to magnetic tape and sent to the State for final processing. This system could easily be converted to a real time system. The manually operated stations handle a variety of monitoring parameters: dust, fall and sulfation rate are measured at 7 stations; suspended particulates, at 55 stations; daily maximum sulfur dioxide and nitrogen dioxide, at 36 stations. The Airmon system to be installed will consist of a central data processing station and eight remote stations. It will be easily expandable to 41 stations with the capability of handling 16 sensors with interrogation of each sensor each minute. Continuous monitors will measure eight pollutants directly and calculate oxides of nitrogen and non-methane hydrocarbons. The stations are designed to be compatible with Federal Continuous Air Monitoring Projects Stations and will be one of the best systems in operation in the U. S. 0

22895 APTIC NO. 42110

Bettencourt, Andre

FUTURE PROSPECTIVES. (*Perspectives d'avenir*). Text in French. *Pollut. Atmos. (Paris)*, 14(54):127-130, April-June 1972.

General problems of city and industry planning are outlined with special regard to environmental protection. The juxtaposition of industry and residential areas, a basic cause of environmental pollution, will be eliminated by decentralizing industry and separating industrial from residential areas. Environmental protection aspects will be increasingly considered when choosing sites for industrial plants, for which the latest pollution control techniques will be required. Automatic air pollution monitoring networks will be set up. Problems of environmental protection regarding new cities around Paris and in the country are discussed.

22896 APTIC NO. 41134

Calvert, James D., Jr. and William L. Heilman

NEW APPROACH TO POWER PLANT SITING. *Am. Soc. Civil Engrs. J. Power Div.*, 98(1):93-102, June 1972. (Presented at the American Society of Civil Engineers, Annual and National Environmental Engineering Meeting, St. Louis, Mo., Oct. 18-22, 1971.)

Demands for environmental awareness involve a very comprehensive, broad scale map searching technique to locate power plant site possibilities. A repetitive, but systematic, evaluation and selection procedure is then applied. The technique is based upon an increasing degree of evaluation as the number of remaining site possibilities is reduced through a series of site rating applications. The rating system consists of numerical evaluation of site characteristics in three general categories, namely: engineering feasibility; environmental effects and public acceptance; and economic considerations. Weightings are applied to the numerical values in each category and the weighted values are then combined to obtain an overall site rating number. This number is then viewed in comparison with similar numbers derived for other sites to arrive at a priority listing of site development possibilities. (Author abstract modified)

22897 APTIC NO. 41991

Chlebowski, Ronald J.

THE AIR POLLUTION STORY IN ALLEGHENY COUNTY, PITTSBURGH, PENNSYLVANIA. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet.*, 2nd, Edgewood Arsenal, Md., 1971, p. 30-34 (March 24-25.)

NTIS, DDC: AD 729929

In Pittsburgh and Allegheny County the topographical features, river valleys, and hills lend themselves to an excessive number of nocturnal inversions, over 150 inversions/yr of various intensities. These inversions act as a lid and prevent pollutants from mixing vertically. This is compounded by the fact that the ridges and valleys limit horizontal dispersion by the wind and concentrate pollutants in populated areas. Steel and coal cause serious air pollution problems in the concentration of sulfur oxides and fine particulates. Seventy-one major industries and sources are included in the emergency episode plan for Allegheny county. Each has been required to implement a three-stage plan for cutbacks. Cutbacks at each stage to be triggered by a forecast of 36 hr or more of adverse meteorological conditions. When alert levels are reached, as determined by the Weather Service or by County Health Dept. meteorological consultants, industry and other sources are contacted and ordered to make cutbacks according to a predetermined schedule. A Board of Air Pollution Appeals and Variance Review has heard 220 appeals since April, 1970 and has denied two appeals outright, has granted limited extensions of time to 136, and has influenced 23 firms into compliance immediately. Tough ruling rigid time limits and

comply-or-shut-down policy have led to significant achievements in the first year of operation. Continuous monitoring is being upgraded to have the capability of handling 99 stations with as many as 20 sensors at each station. Allegheny County has found that it can no longer rely on voluntary compliance and, that unless there is a law with teeth in it, industries like individuals, will follow their own narrow economic advantage.

22898 APTIC NO. 41988

Conneil, George W.

WELCOME TO EDGEWOOD ARSENAL. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet.*, 2nd, Edgewood Arsenal, Md., 1971, p. 11-12. (March 24-25.)

NTIS, DDC: AD 729929

Participants are welcomed to Edgewood Arsenal for the technical meeting of the Chemical and Biological Division of the American Ordnance Association. The unique position of the arsenal in its handling of toxic materials is explained in this introductory address. Edgewood Arsenal operates under the most stringent Federal and State Air and Water quality standards and its personnel have become experts in a number of aspects of pollution including incineration, air and water analysis, sampling and monitoring techniques, vapor and aerosol filtration, and scrubbing techniques. The development and engineering in these areas is conducted at the Edgewood Arsenal and carried out at the Rocky Mountain Arsenal near Denver, Colo., Tooele Army Depot in Utah, Pine Bluff Arsenal in Arkansas, and other Army depots throughout the U. S. The U. S. Army Environmental Hygiene Agency, located at Edgewood Arsenal, carries out the responsibilities of the Army Surgeon General in monitoring the health and welfare aspects of environmental pollution, conducts field investigations and special studies, and recommends where abatement measures are required for protection of health.

22899 APTIC NO. 41796

Fri, Robert W.

ENVIRONMENTAL PROTECTION AGENCY. (40 CFR PART 52). NATIONAL AMBIENT AIR QUALITY STANDARDS APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. *Federal Register*, 37(115), Part II: 11826-11848, June 14, 1972.

Regulations are proposed for 25 of the 41 states whose state plans for implementation of the national ambient air quality standards were not approved by the Administrator of the Environmental Protection Agency. Most of the regulations set forth procedures for reporting and record keeping by source owners and operators and for release of emission data to the public. Other regulations deal with compliance schedules, review of new sources and modifications, and nitrogen oxides emissions. The states included are Arkansas, Delaware, Georgia, Hawaii, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, Ohio, Oklahoma, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Washington, Wyoming, and the U. S. Virgin Islands.

22900 APTIC NO. 41990

Greenfield, Stanley M.

CHANGES IN FEDERAL ORGANIZATIONS FOR ENVIRONMENTAL CONTROL. CHANGES FLOWING FROM THE ESTABLISHMENT OF THE ENVIRONMENTAL PROTECTION AGENCY. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet.*, 2nd, Edgewood Arsenal, Md., 1971, p. 23-29 (March 24-25.)

NTIS, DDC: AD 729929

The establishment of the Environmental Protection Agency has provided much needed centralization of the pollution related activities of the Federal government. Fragmentation of

the Federal anti-pollution effort has long been a formidable deterrent to close cooperation on environmental control matters between the Federal government and State and local agencies. The budget of EPA for fiscal 1972 is \$2,451,000,000, an increase of 91% over the previous year for all the agencies now under EPA. Ten regional offices have been established to facilitate cooperation at the local level of State and local pollution control officials, industry, and local citizen action groups. President Nixon has given the EPA a mandate for improvement that has been called the most comprehensive ever to have come from the executive office. The President recommended among other things: State land use planning toward a national land use policy, restrictions on ocean dumping, reform of pesticides legislation, a tax on sulfur oxides emissions and leaded additives in gasoline, Federal-State control on mining operations, establishment of State and regional power plant siting authorities, regulation of noise pollution, regulation of toxic substances, and greatly expanded open space and recreational programs.

22901

APTIC NO. 41992

Heller, Austin N.

CAN THE URBAN ENVIRONMENT BE MANAGED American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet., 2nd, Edgewood Arsenal, Md., 1971, p. 35-40. 6 refs. (March 24-25.)

NTIS, DDC, AD 729929

On May 20th, 1966, New York City passed its first comprehensive air pollution control law. It stipulated that sulfur requirements for fuel must be controlled from a maximum of 2.2% in 1966 to 1% by 1971; directed that all on-site incinerator emissions be controlled, as well as municipal incinerator emissions; and, that all No. 6 fuel oil burners be upgraded. Sulfur dioxide emissions have been reduced from 890 to 390 kilotons/yr from 1966 to 1970, but there has been no decrease in major pollution from automobiles. Even greater efforts than had been calculated will be required to meet even more stringent standards. A detailed reportage of fuel oil deliveries is being considered to determine the districts most in need of strict control. To reach a 0.03 ppm annual average standard for SO₂, power plants will be required to even further reduce the sulfur content of their fuels and to eliminate, if possible, some plants in the City. The management of America's environment can be achieved most readily with cooperation on all governmental levels and through vigorous and innovative action. The most important role of both government and industry is that of setting an example that would arouse public support for comprehensive legislation in the environmental areas.

22902

APTIC NO. 41675

Holloway, James O.

CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU PERMIT SYSTEM. Chattanooga-Hamilton County Air Pollution Control Bureau, Chattanooga, Tenn., Technical Div., 60p., Jan. 1972. (Available for \$2.00 from Public Information Officer, Chattanooga-Hamilton County Air Pollution Control Bureau, Room 201, City Hall Annex, Chattanooga, Tenn. 37402.)

Ordinance requirements are such that any and all new installations of fuel burning, refuse burning, and process equipment must be administered through a Permit System. After Oct. 14, 1972, all existing fuel burning, refuse burning and process equipment must be under a Certificate of Operation. All such equipment must be registered with the Bureau, but not all equipment is required to be permitted. Installation and Operating Permits and Certificates are not applicable to equipment used exclusively for heating a dwelling of less than three families, to equipment used for burning gas, number one or number two fuel oil, or to internal combustion engines. All new equipment which may be a potential source of air pollution and installed on or after the Oct. 14, 1972 deadline must

be registered with the Bureau and issued an applicable Permit or Operating Certificate. Adequate sampling and tests will be made to insure continued compliance. When a Certificate of Operation is refused, suspended or revoked, the Director of the Bureau is authorized to seal the process or equipment until the owner complies with the provisions of the air pollution ordinance. The issuance of a Permit or Certificate by the Bureau does not relieve the operator or owner of the responsibility to comply with all limitations and standards. Sample equipment registration and permit application forms for several industries are presented.

22903

APTIC NO. 41228

Jutze, George A. and Martin F. Massoglia

DEVELOPMENT OF EMERGENCY PROCEDURES FOR THE PREVENTION OF AIR POLLUTION EPISODES STATE OF WISCONSIN. (FINAL REPORT) PEDCO-Environmental Specialists, Inc., Cincinnati, Ohio and Research Triangle Inst., Environmental Protection Agency Contract 68-02-0044, Task 3, 220p., Dec. 20, 1971.

NTIS: PB 207309

The documents developed for the State of Wisconsin for its Emergency Episode Program are presented. The documents are of two types those which are required to be filed with the Environmental Protection Agency in the State's Implementation Plan and those which the State can actually use as working manuals in implementing its program. The implementation plan documents include: prevention of air pollution emergency episodes; summary tables for episode strategies; point source emission reduction procedures emergency episode plan; and regulations for prevention of air pollution emergency episodes. Working manuals included are the Communications Manual for the State Emergency Operations Control Center; Communications Manual for the Regional Emergency Operations Control Center (Southeast Wisconsin Intrastate Air Quality Control Region); Standard Operating Procedure for the State of Wisconsin Air Pollution Episode Emergency Operations Control Center System; and Master Checklist an Operational Guide for Air Pollution Episodes. Major sources to be controlled include power generation, fuel burning sources, incineration, motor vehicles, and public transportation.

22904

APTIC NO. 42030

Levi, Donald R. and Dale Colyer

LEGAL REMEDIES FOR POLLUTION ABATEMENT.

Science, 175(4026):1085-1087, March 10, 1972. 30 refs.

The court action approach to pollution abatement may have two important results. First, actual or potential cases of pollution may be halted, reduced, or prevented. Second, the problems and insecurities resulting from many individual actions may lead to the more comprehensive and rational planning that is needed in the present situation. Common law may provide the individual with a recourse in abatement under the nuisance law, private and public. The suit may ask for damages or an injunction or both. Many courts apply the balancing of interests test to determine whether a nuisance should be shut down. Trespass provisions may provide some recourse in the case of polluted air and water. Either the riparian doctrine or the prior appropriation concept may become useful to combat water pollution. In general, the common law remedies are of limited scope for they do not eliminate pollution, prevent irreversible acts, or provide any general approach to the problem. Statutory remedies exist under the Federal and State Declaratory Judgement Acts and the River and Harbor Act of 1899. The Environmental Policy Act of 1969 is another possibly strong statutory remedy. Constitutional provisions, such as the public trust doctrine that protects public land, or the doctrine of unenumerated rights of the ninth amendment probably constitute the most powerful weapons of the environmentalist. A procedural restraint, standing to sue, has frequently prevented concerned citizens from being able to institute legal action in the past. The con-

cept that one must be personally affected before being considered a proper party to complain prevents suits of little more than nuisance value, and prevents overloading the court dockets. Recent court decisions have made inroads into this restrictive application of standing to sue. The courts offer one means of speeding up the process of finding realistic, rational, and equitable solutions to the environmental problems.

22905

APTIC NO. 41015

Lieberman, Joseph A.

EPA, ENVIRONMENTAL LEGISLATION AND ENERGY. *Trans. Am. Nucl. Soc.*, 15(1):73, June 18-22, 1972.

General areas of Environmental Protection Agency responsibility are mentioned. Under the Clean Air Act, EPA was required to set standards for national ambient air quality, hazardous air pollutants, and new stationary sources. Under the Federal Water Pollution Control Act, the states have primary responsibility for setting water quality standards and enforcing them. The EPA takes part in approving and assisting in the enforcement of these standards. The Rivers and Harbors Act of 1899 prohibits discharges of refuse into navigable waters of the U.S. without a permit. The EPA enforces this Act and administers a permit program. Authorities have also been transferred to EPA from the Bureau of Radiological Health of the Department of Health, Education, and Welfare, from the former Federal Radiation Council, and from the Atomic Energy Commission. Also, EPA reviews and comments on all environmental impact statements that involve areas in which EPA has expertise or legal responsibility.

22906

APTIC NO. 41051

Mitsuo, Eiichi

RECENT CONDITION AND COUNTERMEASURE OF AIR POLLUTION IN TOKYO. (*Tokyo to ni okeru Taikiosen no Genjo to Taisaku*) Text in Japanese. *Rodo no Kagaku (Dig. Sci. Labor)*, 27(2/3):19-25, March 1972.

The present condition of pollution by sulfur oxides and automobile exhausts and its monitoring in Tokyo was described. Sources of soot and smoke, such as combustion equipment, numbered about 11,500. The number of cars in Tokyo was 610,000 in 1960. It increased to 2,100,000 by 1970 and has doubled every 5 years. The amount of heavy oil consumption which generates sulfur oxides quintupled in a decade from 1960. The mean one hour value was 0.036 ppm at the 8 measuring spots in 23 wards in 1968, but reached 0.054 ppm in 1968. Less particulate matter appears during the spring. Near the industrial areas, heavy metals, such as vanadium and iron are frequently found. Carbon monoxide was measured from June to July in 1970. There were 11 stations that gave hourly averages throughout the continuous 8 hr measurement which indicated 10 ppm or more. In Jan. 1971, countermeasures to air pollution were made. In order to reduce the daily mean of hourly value to 0.05 ppm and the highest value to 0.1 ppm, countermeasures for fuel control and consolidation of monitoring network took effect to attain an environmental standard by 1973. Concerning reduction of automobile exhaust gases, the advances such as idling adjustment, consolidation of equipment to decrease exhaust gases, and a traffic regulation should be promoted while, the redevelopment of the suburbs and lead countermeasures are advanced.

22907

APTIC NO. 41165

Mori, Kazuhisa

SYMPOSIUM ON PUBLIC NUISANCE CONTROL PLANS. (*Simpodium kogaiboshi kankaku ni tsuite*) Text in Japanese. *Taiki Osen Kenkyu (J. Japan Soc. Air Pollution)*, 4(1):70-24, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The correlation between air pollution and meteorologic factors in the Mizushima industrial area was examined from the data available since 1965. Data on wind direction and velocity and

measurements of sulfur dioxide concentration indicated that the probability of having 0.2 ppm SO₂ concentration in the area was 80% when the wind is N-SW and the wind velocity is 2 to 4 m. The goal established for 1975 is to avoid such a heavy concentration of SO₂ under similar meteorologic conditions. The first feasible step toward this end is collectivization of high stacks and dispersion of stack gases. Pollution predictions were obtained from theoretical dispersion and wind tunnel experiments. From these calculations, the original stack design plans were revised to set the total number of stacks at 216. Total gas emission will be 30,323,000 N cu m/hr, and the total SO₂ emission will be 17,908 N cu m/hr. According to this plan, 75% of the total SO₂ will be emitted by 11 stacks that are higher than 150 m, and 94% will be emitted by 42 stacks higher than 100 m.

22908

APTIC NO. 42112

Moureu, Henri

THE GENERAL PROBLEM OF AIR POLLUTION. (*Le probleme general de la pollution atmospherique*) Text in French. *Pollut. Atmos. (Paris)*, 14(54):131-133, April-June 1972.

General problems of air pollution as well as the activity of different organizations engaged in the air pollution area are reviewed. Air pollution with its scientific, medical, technical, social, economic, financial, and legal aspects, requires multidisciplinary studies. The Association for Air Pollution Prevention (APPA), created in 1958, has the tasks of initiating and coordinating research, providing education and information, as well as suggesting appropriate control measures. The Association has been decentralized into 21 Regional Committees. An Air Pollution Research Center (*Centre de Recherches sur la pollution atmospherique*) has been established. The Scientific Committee for Concerted Action in the field of Air Pollution (*Comite Scientifique d'Action Concertee dans le domaine de la Pollution atmospherique*) conducts studies on the biological and toxicological effects and physical and chemical properties of air pollutants, on atmospheric diffusion of pollution, as well as on pollution control measures with regard to fuels, industrial wastes, and automobiles.

22909

APTIC NO. 41220

Nedogbchenko, M. K. and G. A. Avvakumov

POLLUTION OF ATMOSPHERIC AIR BY MOTOR TRANSPORTATION EXHAUST GASES AND MEASURES FOR COMBATING THIS POLLUTION. *Council for Mutual Economic Aid (CEMA) and Yugoslav Socialist Federated Republic, Snizheniye Zagryaz. Vozdushka Gorodskh Vykhopnynu Gazam Avtomob.*, Proc. Symp., 2nd, 1971. Translated from Russian 7p.

Air sampling stations and networks in the USSR which monitor exhaust gases from motor transportation are described. Stations are located near main highways, with consideration given to traffic density and the width of the sections of the street. Air samples are taken daily in the morning, during the day, and in the evening. The construction of beltways around cities in the USSR eliminates traffic through the city and reduces air pollution. The concentration of harmful substances is higher by a factor of two on narrower streets than on wide ones. Research is being conducted on the development and production of new types of antiknock compounds that could lead to the replacement of tetraethyl lead. Various USSR abatement and research programs are noted.

22910

APTIC NO. 42182

Nelson, J. R.

MANAGING ENVIRONMENTAL PROBLEMS IS A JOB FOR A PROFESSIONAL. *Paper Trade J.*, 156(28):20-21, July 3, 1972.

Environmental concern is now a fad. Ecology is the totality of relationships between man and his environment. If there is a

fad, it is in the interpretation of value judgements and in the communication of priorities. Every environmental question is a balance of judgements and principles. The use of an environmental consultant is called for to provide the knowledge necessary to coordinate the facts with the vested opinions on environmental issues and assure that objective decisions are reached. An environmental consultant must have a thorough understanding of industry and ecology and the economics thereof.

22911

APTIC NO. 41444

Noll, Kenneth E.

TRANSPORTATION AND AIR POLLUTION. *Traffic Eng.* 42(9):12-17, 56, 57, June 1972, 16 refs.

The ultimate solution to the motor vehicle air pollution problem requires a comprehensive and coordinated urban transportation system which provides for both population mobility and a healthy urban environment. The projected reductions due to improved exhaust control devices will not achieve satisfactory air quality by 1975, the deadline year. The five major areas in which air pollution reductions can be achieved are urban planning, rapid transportation substitution, improved automobile pollution control devices, freeway location and design, and traffic regulation and flow controls. Only traffic regulation and flow controls can provide a reduction in present air pollution levels in time to meet the deadline for compliance with Federal air quality standards. The different effectiveness dates for the five methods for controlling air pollution from automobiles are: 25-50 yrs for urban planning; 10-20 yrs for comprehensive rapid transit; 10-15 yrs for effective control devices; and 10-15 yrs for location and design of highways. We can at present increase the capacity of the system through traffic control and bus transit.

22912

APTIC NO. 42167

Osselet, M

REGULATIONS APPLICABLE TO AUTOMOBILES. (*La réglementation applicable aux automobiles*). Text in French. *Pollut. Atmos. (Paris)*, 14(54):157-158, April-June 1972.

Present regulations applied to automobiles in France are reviewed. An increase of 70% in the number of automobiles is expected by 1985, while the increase in the traffic in city centers, primarily of Paris, may not exceed 20%. Violations of pollution standards by manufacturers and automobile operators are subject to fine or imprisonment for repeaters. Prototype and statistical production control are required, and provision is made for controlling automobiles in use. Opacity tests are specified for new and used diesel engine vehicles, and the emission and noise standards will be enforced by environmental protection police. Three different prototype tests are specified for gasoline-engine vehicles. Crankcase gases must not exceed 0.15% of the fuel consumed by weight, and the carbon monoxide emission at idle must not be higher than 4.5%. Standards on CO and hydrocarbon emissions, applying to all operating conditions, will be imposed in October 1971 and September 1972, respectively. Used car engines are required to comply with the standard specifying a maximum CO emission of 4.5% at idle only. New and stricter regulations will be imposed in 1974. 0

22913

APTIC NO. 41019

Ozaki, Masamichi

THE PRESENT STATUS AND TREND OF AIR POLLUTION MONITORING SYSTEM. (*Taiki osen kanshi shisutemu no genjo to joko*). Text in Japanese. *Kagaku Kyoji (Chem. Factory)*, 16(3):28-31, March 1972.

The number of environmental observation stations is increasing due to the prevalence of air pollution and for the purpose of monitoring emission sources. The recent trend is coordination of the data from these monitoring stations for the purpose

of formulating regulations and countermeasures for pollution emergencies. The future trend will be coordination of monitoring activities by local government agencies. In general, a monitoring system comprises a central monitoring station, air quality measurement stations, and factory monitoring stations, and includes a measurement telemeter system, communication system, and information data processing system. Measurements are received from automatic continuous meters, weather vanes, anemometers, flue gas measurement equipment, and mobile monitoring vehicles by telemeter wireless receivers and are conveyed to the central telemeter monitoring control board; the data are distributed to input and output typewriters, tape reader, tape puncher, data treatment system, and graphic data indicating panel. In the future, a well-coordinated centralized monitoring system will be developed to cover not only one prefecture, but larger areas involving neighboring prefectures. Under this system, a prefectural central monitoring station communicates with various municipal monitoring stations, which will also operate in similar manner with local monitoring stations.

22914

APTIC NO. 41989

Patton, Maurice G.

THE JOINT ROLE OF DEPARTMENT OF DEFENSE AND INDUSTRY IN PROTECTING THE ENVIRONMENT. *American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet., 2nd, Edgewood Arsenal, Md., 1971, p. 13-20. (March 24-25.)*

NTIS, DDC: AD 729929

The Department of Defense has been taking positive action to improve practices and develop long range plans for continued improvement, as have industries and private groups. The correction of environmentally undesirable conditions will demand action by all segments of society. Each of the components of the Dept. of Defense has responded in a way that best fit its own organization. The chairman of the Dept. of the Defense Environmental Control Committee has been made a staff assistant in the office of the Deputy Assistant for Environmental Quality within the office of the Assistant Secretary of Defense for Health and Environment. Within the Department of the Army, the Environmental Protection Group has been established under the Director of Installations in the office of the Deputy Chief of Staff for Logistics. The Department of the Navy has established an Environmental Protection Group in the office of the Deputy Chief of Naval Operations, and all major commands of the Navy have been ordered to assign a special individual for coordination of all actions that affect the environment. In addition, the Secretary of the Navy has been assigned a civilian special assistant with primary interest in environmental matters. The Dept. of the Air Force has placed its Environmental group in the office of the Director of Civil Engineering. An Environmental council has been established with members from other offices in the Air Force. The chairman of this Council is the Chief of the Environmental Protection Group.

22915

APTIC NO. 41703

Philberth, Bernhard, Karl Philberth, and Heimut Borchardt

ENVIRONMENTAL PROTECTION THROUGH TAX POLICY. PROPOSALS ON GASOLINE AND AUTOMOBILE TAXES. (*Umweltschutz durch Steuerpolitik. Vorschlaege zum Benzin-, Mineraloel- und Kfz-Steueren*). Text in German. *Stadt-hygiene (Uelzen/Hamburg)*, no. 4:101-103, 1972.

Proposals on tax policies as a means of environmental protection are outlined with special application to transportation. The principle of high taxes on products causing great damages to the environment should be applied also to the automobile industry. In order to establish maximum allowable concentrations for heavy metals in the air, a surtax of approximately 0.33 cents per gramme of lead in the gasoline should be imposed, which would stimulate the development of new engine

designs operating on lead free gasoline. Increased benzopyrene and carbon monoxide contents as a result of lead-free gasoline would not occur in the exhausts from diesel and Wankel engines. Surtaxes on each engine model, in proportion to the specific damage caused to the environment, would stimulate the design of cars causing less damage to the environment. Since the taxes on private transportation are still too low, the taxes on automobiles and gasoline should be increased to subsidize public transportation.

22916

APTIC NO. 42193

Poma, Karel

ENVIRONMENTAL MANAGEMENT IN BELGIUM.

(Milieubeheer in België). Text in Dutch. *Chem. Weekblad*, 68(20):B9-B11, May 1972

Environmental management in Belgium is outlined with special regard to water and air pollution. Systematic sulfur dioxide and smoke measurements were carried out at 180 sampling stations in 1970. While there are no standards on industry and power plant-generated air pollution, cities such as Brussels, Gent, Antwerpen, Luik and Chaleiroi will be required to use non-smoking fuel with a maximum sulfur content of 1% for domestic heating as of July 1973. Another standard requires a maximum carbon monoxide content of 4.5% in the exhausts from 1971 car models, but a higher value of 5.5% will be tolerated during a 1-year transitory period. At the same time, the crankcase gas emission should not exceed 0.15% of the fuel consumption. The low efficiency in many cases of legislative measures is due to the lack of adequate enforcement decrees.

22917

APTIC NO. 40979

Ruckelshaus, William D.

ENERGY AND THE ENVIRONMENT. *Ind. Heating*, 40(5):820, 822, 874, 826, May 1972. (Presented at the World Energy Conference, Washington, D. C., Sept. 24, 1971)

The demand for energy rises by 4.5% each year. The amount of energy the country wants will double by 1985. As the young and the poor move toward prosperity, demand is expected to increase even further. There is a need to achieve a balance between man's needs and his habitat. Guidelines for successful environmental management must include recycling and/or recovery of valuable exhaustible commodities. Our true energy needs must be calculated; energy must not be wasted on falsely stimulated growth due to advertising, peer competition, poor industrial planning, or deep seated cultural expectations about the nature of progress. Whole new energy systems must be developed to make more efficient use of our resources. Many Americans are demanding a quality environment. Proper management of the planetary eco-system will be the most difficult task mankind has ever faced for the emphasis must now return to the quality of life. A power plant siting bill would help provide needed energy. Other legislation and research programs are discussed.

22918

APTIC NO. 40963

Sheridan, John H.

CLEAN-AIR RULING CLOUDS THE ISSUES. *Ind. Week*, 173(11):13-14, June 12, 1972

Controversy has arisen over the lengths to which the Environmental Protection Agency can and must go to protect the quality of air in regions which are relatively pollution-free. U.S. District Court Judge John H. Pratt, in a case brought by the Sierra Club, ruled that state implementation plans to achieve national ambient air quality standards must prohibit significant deterioration of air quality anywhere, even if the degree of pollution would be below EPA limits. Judge Pratt gave the EPA ten months to review all plans and veto any provisions which would permit deterioration of clean air. The EPA and the Justice Department filed a notice of appeal, and

the U. S. Chamber of Commerce announced that it is considering filing an amicus curiae brief. There is concern that the ruling will prevent the development of industry in rural areas and thus intensify the pollution problems of the cities. The objection of the EPA to the ruling involves the legal interpretation of the enforcement powers of the agency under the 1970 Clean Air Act amendments.

22919

APTIC NO. 42111

Sommer, M.

THE ACTIVITY OF THE REGIONAL COMMITTEES OF THE POLLUTION CONTROL ASSOCIATION. (L'activité des Comités Régionaux de l'A.P.P.A.). Text in French. *Polut. Atmos. (Paris)*, 14(54):177-180, April-June 1972

The activity of the Marseille Interdisciplinary Regional Committee of the Pollution Control Association (A.P.P.A.) is described. Pollution surveys by means of a monitoring network including 23 stationary stations for sulfur dioxide and dust concentration measurements, carbon monoxide measurements at highways as well as information, public relations, and education are the basic activities of the Marseille Regional Committee. Automatic, continuously recording instruments will be purchased, and background concentration measurements will be carried out. An epidemiological survey, with special regard to respiratory diseases, particularly chronic bronchitis, is planned. Automatic pollution recording network and a smoke desulfurizing pilot plant have been installed, and the effect of pollution on plants were studied in a new highly polluted industrial area. Though the pollution level in the Marseille region has shown a definite decrease since 1964, it is still higher than that in Paris. The CO concentrations, measured during the daytime, range from 18 to 20 ppm.

22920

APTIC NO. 41477

Stein, Robert E.

THE POTENTIAL OF REGIONAL ORGANIZATIONS IN MANAGING THE HUMAN ENVIRONMENT. Woodrow Wilson International Center for Scholars, Washington, D. C., Environmental Series 202, 61p., May 1972, 155 refs.

Both bilateral and multilateral in nature, regional organizations have a history of studying and managing international problems, including those of an environmental nature. Until now, their success has been mixed. For some of these organizations, environment and pollution formed a part of their work from the beginning; for others, environmental concerns were tacked on; for still others, there is a potential role for dealing effectively with various environmental problems. Their greatest potential lies in the fact that the most effective management of environmental problems can be done by organizations composed of those states with a direct interest in the problem. Among the functions that regional organizations can perform are three broad categories of activities which can be classified as study (research, information gathering, and exchange), catalyst (promotion of actions at the global, national, and supranational levels), and management (problem notification, planning, monitoring, standard setting, regulating, and dispute settlement). Examples of regional management discussed are the Rhine and Danube Rivers and the International Joint Commission between the United States and Canada which has worked to clean up the Great Lakes. Broader coordination is needed among regional organizations and between regional and global organizations. Potential roles for regional organizations are discussed.

22921

APTIC NO. 41557

Ulled, Armando

ENVIRONMENTAL POLLUTION AND THE ECONOMY. (La contaminación ambiental y la economía). Text in Spanish. *Ingeniería*, Mexico City, 73(1018):25-29, Aug. 971, 4 refs.

Various aspects of environmental pollution are discussed. Included are topics such as the main pollutants occurring in the environment, who is involved in the pollution problem, the role of the government in organizing the measures to be taken in the control of pollution, the contribution of the World Health Organization in this matter, and a review of solutions found by some of the European countries in the fight for the preservation of the ecology. Detection and monitoring of air pollutants is assuming a character of international concern. The World Health Organization has provided recently for a world system of air pollution monitoring including nonpolluted regions such as the polar areas. Attention is focused on six elements such as sulfur dioxide, solid particles, carbon monoxide, photochemical smog, nitrogen oxides, and lead. Data are fed into a central computer system connected with an alarm facility to be triggered whenever certain pollutant levels are exceeded at a given point of the world map. The economical aspects of the pollution problem carry a national character in that they depend on the specific features of each country's economy and ecology.

22922

APTIC NO. 41619

Vollmer, Howard M. and David Ackerman

DEPARTMENT OF ECOLOGY: NEW ARM OF STATE GOVERNMENT. *Environ. Sci. Technol.*, 5(6):506-511, June 1971.

The design of the new Department of Ecology that was created by Stanford Research Institute (SRI) for the state of Washington is described. Some features of this design, and the method used to create it, may be applicable to other public and private institutions that are trying to cope with environmental problems. The SRI design strategy sought to develop an organizational structure that would maximize task performance and provide responsive and flexible structures to meet changing conditions, new technological requirements, new organizational authority patterns, and the ability to adapt to future enlargement of departmental responsibilities. It is recommended that the department immediately adopt an organizational structure integrating functionally related activities at all levels previously performed by four separate agencies. Other recommendations are that the department establish at least five regional offices to provide departmental services related to permits and certificates, surveillance and enforcement, technical observations, assistance to regional or local agencies, and information on environmental quality matters for the public; that the organizational structure of the department include a well staffed Office of Planning and Program Development containing a strong Operational Planning Division, with separation of the parts of the department that are concerned with day-to-day operational services; and that environmental monitoring be conducted as a major activity within a department of Technical Services, separated from the surveillance and enforcement activities conducted within the Office of Operations. The proposed structures of the Public Services and Administration and Planning branches of the department are described.

22923

APTIC NO. 41023

Wanner, H. U.

MEASURES FOR CLEAN AIR MAINTENANCE. (Massnahmen zur Reinhaltung d. Luft). Text in German. *Schweiz. Rundsch. Med.*, 61(10):317-322, March 7, 1972. 16 refs. 40991. Watanabe, Iro. STUDY ON RELOCATION OF MANUFACTURING INDUSTRIES IN LARGE CITIES. (Daitoshi naibu ni okeru koso sabauchi keikaku). Text in Japanese. *Nihon Gokyo Ricchi Senta Kenkyu Nenpo* (Ann. Japan Ind. Location Center), no. 6:225-241, Dec. 1971.

The results of a recent questionnaire survey showed that 40% of the factories in Tokyo employing more than 10 workers expressed their desire to relocate, and 60% of factories had no intention or desire to move from the present location. While there is a definite tendency for relocation of large-scale factories,

AIR POLLUTION ABSTRACTS, SEPTEMBER 1972

ries, middle-sized and small industries generally are staying at the present site, and if they expand, they tend to add buildings onto the present site. Most factories give, as their reasons for moving, the need for more space, rather than air pollution or any other type of pollution which they are creating in the area. In 1964, in Tokyo Metropolitan area, approximately 2000 factories with more than 50 sq m of working areas were newly constructed. The ward with most new construction (219) was Ota Ward, where factories and residences are completely mixed. According to the Complaint Department of the Ota Ward Office of the Tokyo Metropolitan Government by far the greatest number of complaints are made against noise, compared with other forms of public nuisance as soot, bad odor, dust, and vibration. Tokyo's plans for collective relocation of industries, collectivization of small industries by building plants and renting space, and encouragement of relocation by purchasing the site after an industry has moved out, are discussed.

22924

APTIC NO. 41653

Witherspoon, Robert, John Hoicka, Terry Trumbull, and Don Infield

GOVERNMENTAL APPROACHES TO AIR POLLUTION CONTROL: A COMPENDIUM AND ANNOTATED BIBLIOGRAPHY. *Inst. of Public Administration, Washington, D. C., Office of Air Programs Contract EHS 70-126, Rept. APTD-0749, 545p., July 15, 1971. 645 refs.*

NTIS: PB 203111

This study presents a compilation of information to be used for the evaluation of present programs and the development of new approaches to air pollution control. Federal legislation with particular reference to the Clean Air Act has emphasized the interdependence of agencies involved in air pollution control. Voluntary compliance is needed in air pollution control because of the private and decentralized nature of the problems. Compliance with emission standards is thought to depend on cultural climate and the development of an environmental ethic. Land use controls have not been effective. Private legal action has been effective to obtain relief but will not work as an overall approach. Cost sharing has extremely limited value in abatement, because the firms that qualify are those most able to bear the cost in any case. Economic incentives provide the necessary profit motive to influence the actions of industry. Emission charges are the most effective means of emission regulation but political considerations are retarding their application. The approach taken in New South Wales, Australia is based on emission standards focused on the entire premises rather than on process and seems to work well. In the future more work should be done on source monitoring and administrative feasibility.

22925

APTIC NO. 42169

Wolff, Hans-Christian

THE TIME, THE COOPERATION AND PROTESTS FROM THE COMMON MARKET PARTNERS. THE SECOND STAGE OF THE GASOLINE LEAD LAW. (Die Zeit, die Zusammenarbeit und Proteste aus der EWG: Die zweite Stufe des Benzin-Bleigehaltes). Text in German. *Umwelt (Duesseldorf)* 2(1):50-51, June-July 1972.

The first stage of the gasoline-lead-law went into effect on Jan. 1, 1972. The lead concentration in all gasolines was reduced to 0.4 g/l. The legislation came too rapidly for the mineral oil industry. The construction of new refineries to meet the deadline was impossible. A lowering of the gasoline quality was unavoidable. There was no time for a study of the effect on the 15 million automobiles already in operation. It is suggested that the deadline for the second stage of the lead-law should be reconsidered. This is particularly justified in view of the results of the recent extensive study by the National Academy of Science in the U. S. The study found that the lead concentration of the air in the U. S., whose traffic density is much higher than that in Europe, has not yet reached a level which is acutely dangerous to the population.

22926

APTIC NO. 41102

Woodcock, Leonard

LABOR AND THE POLITICS OF ENVIRONMENT. *Sierra Club Bull.*, 56(10): 11-16, Dec. 1971.

The idea of legislation to give workers the right to sue their employers for damages suffered in plant shutdowns or layoffs resulting from pollution of the environment is proposed. Such a move would not only free workers from the fear of losing their jobs but would also give their employers a powerful new incentive to exert their best efforts in abating the pollution they are presently causing. Furthermore, such legislation should give all workers affected both directly, through loss of jobs, and indirectly, through downgrading, the right to sue in federal and state courts. Where the employer is a corporation, there should be the right to sue the corporation, with the officers and directors joined as defendants. The possibility of being held personally liable would tend to make officers and directors of corporations more vigilant and diligent in avoiding and promptly correcting pollution abuses.

SOCIAL ASPECTS

22927

APTIC NO. 42014

IN THE COUNTRY WHERE ALL ENERGY IS ELECTRICAL. (In dem Land, wo alle Energie elektrisch ist. Text in German. *Umwelt* (Duesseldorf), 2(3):8-12, June/July 1972.

An inquiry concerning the theme: Environmental Protection has been conducted by the Allensbach Institute for Demography asking 2000 inhabitants representing the population of West Germany about their opinion concerning environment problems. About 79% of the population voted for the detoxication of exhaust gases of cars. Also, 61% recommend the assembling of flue gas filters in chimneys of industrial plants. 31% advocated the utilization of electric energy instead of carbon and oil for industrial purposes, and only 22% believed that air pollution could be reduced by using electric heating systems instead of carbon and oil for private households. About 51% of the population wanted the construction of biological sewage plants in order to solve the problem of water pollution, 59% of the population believed that the construction of more refuse incineration plants would reduce the dumping of refuse in the open landscape, and 29% recommended a modern refuse removal system. Almost 35% of the population advocated more intensive information about environment problems in television and newspapers and 57% believed that the present environment legislation is not sufficient.

22928

APTIC NO. 41449

Boon, E. F.

INDUSTRY'S RESPONSIBILITY TOWARDS POLLUTION. *Ingenieur*, 84(5): 93-97, Feb. 4, 1972.

Secrecy in matters of industrial air pollution, and confusion caused by inadequate information does considerable harm to the image of industry. Secrecy results in misinterpretation and public confusion. The social responsibilities of industry include accurate measurement by industry of pollutants creeping into air and water; disclosure of these measurements to experts and to the general public, preferably as regional averages; immediate disclosure of abnormal emissions; prevention of loss in transport; and 50% reduction of all industrial emissions by 1980. Industry is expected to strive for frankness in financial matters as well as frankness in the control of materials.

22929

APTIC NO. 41095

Borelli, Peter, Lester Lees, Mahlon Easterling, Guy Pauker, Carlton H. Klein, and Robert Poppe

PEOPLE, POWER AND POLLUTION: ENVIRONMENTAL AND PUBLIC INTEREST ASPECTS OF ELECTRIC

TRIC POWER PLANT SITING. *California Inst. of Tech., Pasadena, Environmental Quality Lab., Rept. EQL-TM-1, 86p., Sept. 1, 1971.*

Environmental and public interest aspects of electrical power plant siting are discussed. Societal demands, constraints, and choices; open planning; case studies of conflict and resolution; economic aspects; trends in regulations and standards; and unresolved problems of development and research are examined. The public interest in the environment is as important as the traditional economic and technical considerations that usually determine the design and location of power plants. Utilities should, therefore, admit all spokesmen for the public interest; efforts should be the last resort. Effective methods for mediating conflict over the use of air and water and institutions for regulating the public interest in private decisions about the use of land and natural resources must be developed. Present research and development of the power industry is totally inadequate considering both the amount of energy this country uses and the need for cleaner and more efficient technology. So much electricity is being used in the United States today that a tax or charge of only one-half a mill per kilowatt hour could raise three quarters of a billion dollars a year for an accelerated program of government or industry sponsored research. Such a program should be undertaken without delay. Areas for further research include the development of new energy sources; control of emissions from fossil fuel burning plants; development of beneficial uses of waste heat; reduction or elimination of radiation hazards; and novel methods of plant siting. (Author conclusions modified)

22930

APTIC NO. 41132

Coddington, Alan and Peter Victor

ECOLOGY/ECONOMY. *You, Tucson*, 3(1):17-39, Spring 1972. 4 refs.

The common property aspect of several important natural resources is the main reason why market regulation of such resources will almost always lead to rapid exploitation. The over-use of the environment as a waste receptor is tied to the inability of an individual to express his desires for environmental quality, owing to the absence of a market in unpolluted air, land, and water. For the reason, decisions to implement pollution control policies must be political, though it is possible for these decisions to be conceived as attempts to simulate the workings of a market. Political implications and difficulties of environmental control are described. Various forms of environmental policy, including taxes and subsidies, recycling, product durability and planned obsolescence, distribution of employment, and identification of environmental property rights are considered. The depletion of resources such as fuels, metals, fertilizers, and mineral products are mentioned.

22931

APTIC NO. 41647

Kapp, Karl Wilhelm

SOCIAL COSTS OF BUSINESS ENTERPRISE. In *Controlling Pollution. The Economics of a Cleaner America*. Marshall P. Goldman (ed.). Englewood Cliffs, N. J., Prentice-Hall, 1967, p. 82-90.

Instead of falling forth a tendency toward automatic self-stabilization, social processes obey some principle of social inertia which tend to move the system in the same direction as the initial impulse. This principle of cumulative causation constitutes the main social hypothesis and the general conceptual framework for the study of social costs. It is the whole cumulative process of unrestrained concentration of industries and the subsequent growth of urban communities which gives rise to the contamination of the atmosphere beyond the levels of concentration of pollutants that might be compatible with human health. By concentrating on the analysis of internal and external economies, and by stopping short of the introduction of the concept of social costs of unrestrained industrial concentration, traditional theory lends tacit support to the overall rationality of cumulative growth processes, no matter what

their socially harmful effects might be. The dispersion of damages and the excessive expenses for court action act as a deterrent to legal action in the elimination of water pollution in modern industrial cities. Water and air pollution do much more than shift some of the costs of production to people living outside of a given area. They create a new physical environment for man. The cumulative impact of a man made environment on human health is the measure of major and significant social costs. Only a regional approach with federal agencies assuming overall responsibility for water management policies can guarantee the preservation of water resources.

22932

APTIC NO. 40974

Magnuson, Larry W. and Walter C. Barnes, Jr.

AVAILABILITY OF MILITARY-TRAINED ENVIRONMENTAL HEALTH TECHNICIANS TO CIVILIAN HEALTH AGENCIES. *Am. J. Public Health*, 62(5):652-654, May 1972. 17 refs. (Presented at the American Public Health Association, Annual Meeting, 99th, Minneapolis, Minn., Oct. 13, 1971.)

Solutions to the present shortage in environmental health personnel will have to be multidimensional due to the complexity of these problems. One source of manpower which only recently has begun to be tapped in the health care crisis is the use of qualified military health personnel lost from the health field annually. A five page questionnaire entitled Expectations for Employment in Civilian Environmental Health was sent to all enlisted members of the Air Force preventive medicine career field to determine their interest in civilian environmental health positions, as well as education and training level requirements. Analysis of the questionnaires indicated that 80% of the 194 men (and 15 women) were interested in a civilian environmental health career. Less than 10% of the Air Force preventive medicine technicians have college degrees, but another one-third have from 1-3 years of college while the remainder have high school diplomas. Membership in professional organizations, knowledge of civilian job opportunities, confidence in ability to perform the jobs, and salary requirements are considered.

22933

APTIC NO. 42100

Russell, Clifford S. and Hans H. Landsberg

INTERNATIONAL ENVIRONMENTAL PROBLEMS-A TAXONOMY. *Ekistics*, 33(198):394-399, May 1972. 14 refs.

International Environmental problems may be divided into two broad categories, depending on the nature and scope of the international linkages involved: physical-linkage effects, and social-linkage effects. The first may be divided again into global and regional effects, and the second into pecuniary and non-pecuniary effects. It is the combination of persistence and mobility which makes such environmental problems as pesticides, the balance of carbon dioxide in the atmosphere, and the particulate content of the stratosphere global problems. Regional problems often resemble domestic ones, because geographic proximity frequently permits identification of upstream and downstream countries, permitting the assignment of costs of control and the benefits from damages avoided. The distinction between regional and global problems is important, because it may be helpful in seeking international environmental agreements to involve only the smallest possible group of nations. Non-pecuniary social-linkage effects include the concern of citizens of one nation for the preservation of objects and species of the human cultural and natural heritage contained within the boundaries of another nation. The two kinds of trade effects of environmental agreements include loss of export markets as a consequence of the increased costs of maintaining high environmental quality in the exporting country and the erection of barriers to imports in line with the importing country's policies on environmental quality. The dimensions of timing, certainty, magnitude, and reversibility of effects contribute to the sense of urgency with which international environmental problems are approached.

178

22934

APTIC NO. 42069

Sturman, Gerald M.

EFFECTS OF HIGHWAYS ON URBAN ENVIRONMENTS. *J. Environ. Syst.*, 2(1):61-69, March 1972. 3 refs.

Methods for the evaluation of social and economic effects of the construction of a highway in an existing neighborhood are reviewed. Effects to be considered are air and noise pollution, access disruption, loss of job opportunities, and loss of housing. Four traffic noise models, i.e., an empirically derived model, two analytical models including the line source and discrete source models, and a simulation model are described. Access disruption may be measured by a cost analysis similar to that performed for determining the feasibility of highway projects. If the total time and distance for all trips on the post-highway network is greater than the total time and distance of the existing network, the highway has caused disruption. Loss of jobs results from highway condemnation, industrial multiplier effect, and residential multiplier effect. A relationship between percent vacancy in the neighborhood, net loss in the neighborhood housing inventory, and the concomitant change in rents can be established through a supply and demand analysis.

22935

APTIC NO. 40975

Swan, James A.

THE ENVIRONMENT, THE CITIZEN, AND THE ENVIRONMENTAL HEALTH PROFESSIONAL. *Am. J. Public Health*, 62(5):639-641, May 1972. 11 refs. (Presented at the American Public Health Association, Annual Meeting, 99th, Minneapolis, Minn., Oct. 11, 1971.)

Some of the factors which have affected the development of public concern for the environment, as well as stimulated criticism of some public health officials, are considered. Fundamental to this discussion is the nature of what constitutes a problem. Broadly defined, a problem is the perceived discrepancy between reality and our expectancies, and over the past few years there have been changes in both the nature of environmental problems and our expectancies of what environmental quality could be. Scientific research has discovered new, relatively subtle problems which were previously unknown. Mass media, especially television, have exposed millions of Americans to environmental conditions that are far removed from their daily life space. This has increased the average American's appreciation of the diversity of environmental conditions. While prosperity may contribute to pollution, it also affords us the opportunity to contemplate problems like pollution. If the public is to be supportive of environmental health professionals, then they must be informed about the quality of their environment and efforts to protect and enhance it. The importance of effective communications between the public and environmental regulatory agencies cannot be overstated. Environmental quality criteria and standards are mentioned, as well as public hearings. The Measure of Undesirable Respiratory Contaminants Index for air quality is mentioned.

22936

APTIC NO. 41162

Wakaba, K. and M. Watanabe

THE ATTITUDE OF MURORAN CITIZENS TOWARD THE CITY'S AIR POLLUTION. (*Muroran no taiki osen ni taisuru jumin no uchi o tsuite*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan Soc. Air Pollution), 4(1):68, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

The worst polluted area of Muroran has an average of 30 to 60 tons/sq km/mo of settling particles during December and January, and 2.0 to 6.0 mg of sulfur trioxide/100 sq cm/day and during the summer (June-August) 25 to 35 tons of settling particles and 1.0 to 2.0 mg of SO₃. The 24-hour average of sulfur dioxide concentrations for 1967 was 0.05 ppm 45% of the time, and 14% of the time, the hourly average was more than

0.1 ppm. Control areas (nonpolluted) in comparison had an average of 10 ton/sq km/mo settling particles and less than 1.0 mg SO₃. Questionnaires were given to the people of both areas to find out the citizens awareness of air pollution, their interest in their environment, their attitude toward pollution, and their desires concerning environmental protection. The majority of people from the polluted area answered that they desired to move to areas with clean air. The rate of complaints was clearly higher in the polluted area than in the unpolluted area. However, knowledge concerning air pollution was generally limited. While there were many people who felt that citizens should organize a movement for environmental protection, there were a relatively large number of people in the polluted area who felt that air pollution was a necessary social evil.

GENERAL

22937

APTIC NO. 41987

Edgewood Arsenal, Md., Information Office

EDGEWOOD ARSENAL NEWS, PRESS RELEASE.

American Ordnance Assoc., Washington, D. C., Proc. Environ. Pollut. Meet., 2nd, Edgewood Arsenal, Md., 1971, p. 7-10. (March 24-25.)

NTIS, DDC: AD 729929

The challenge to help win the struggle for survival was presented to some 250 representatives of industry and government by Dr. Stanley M. Greenfield, Assistant Administrator for Research and Monitoring, Environmental Protection Agency, at the second Annual Environmental Pollution Symposium at Edgewood Arsenal, Maryland. He noted that efforts to construct a strong military defense have dual benefits in the development of hardware and technical competence needed for environmental control. A long-path infrared detector developed at the Arsenal was demonstrated, a paper was given on the remote Raman spectrometer system about to undergo field tests for the detection of toxic agents and trace constituents in the atmosphere, and the Arsenal's ecology program was described. The recently expanded role of the Department of Defense was outlined.

22938

APTIC NO. 41169

Ito, Kyoji

AIR POLLUTION IN TOKYO. (Tokyo no taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):4-12, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, 1969.)

Various statistics concerning air pollution in Tokyo are presented in tables, graphs, and diagrams. The number of complaints about various forms of public nuisance gradually dropped, with a slight peak in 1963, to approximately 2400

cases in 1967. While general complaints have steadily dropped from 2000 to less than 800 a year between 1960 and 1967, complaints against industries have grown from 600 in 1957 to more than 1600 in 1961, and have stayed the same. The number of cars in Tokyo increased from 490,306 to 1,540,626 between 1959 and 1967, and gasoline consumption grew from 1,186,793 kl in 1957 to 2,145,723 kl in 1966, with heavy oil consumption increasing from 270,277 kl to 889,043 kl in the same period. Settling particles increased from 12 tons/month/sq km in 1957 to approximately 20 tons/month/sq km in 1965, then dropped again to about 14 tons by 1967. Settling particles in residential and commercial areas increased about 20% between 1960 and 1962, but returned to the levels of previous years after 1965. Health examinations of people older than 40 years of age carried out between 1966 and 1969 showed that 3.9% of male and 3% of female in the areas with 0.02 ppm sulfur dioxide concentration suffered from diseases related to air pollution; 4.5% of male and 2.4% of female suffered in the areas with 0.03 to 0.04 ppm SO₂ concentration, and 6.9% of male and 3.4% of female had respiratory diseases in the areas with more than 0.05 ppm pollution.

22939

APTIC NO. 41059

Osmaston, Henry

POLLUTION IN THE TROPICS.

New Scientist, 54(799):569-571, June 8, 1972.

The more complex is an ecological system, the more rare and specialized species it contains, some of which are bound to be eliminated in the simplification which results from even a moderate environmental interference. The tropical rain forest is one such area with an extremely delicate ecological balance. There is a danger that with increasing industrialization and development, tropical countries may embark on a period of unfettered pollution which would do irreparable harm to the areas. Pollution control techniques must be tailored to fit the particular problems of tropical areas. The high mean temperature of the tropics, with small seasonal variations, permits high continuous rates of decomposition of waste products; this can simplify and cheapen treatment. Where atmospheric pollution is concerned, the instability of the intertropical convergence zone, and the steady winds that commonly prevail on either side of it, aid rapid atmospheric mixing in the humid and seasonally humid tropics. In the arid tropics, however, anticyclonic conditions may at times cause serious concentrations of urban or industrial pollution, so the siting and height of major smokestacks need special care. Most of the factors of the socio-economic environment are not peculiar to the tropics, but occur there in particularly aggravated form owing to the predominantly underdeveloped state of the countries which lie in this zone. Technological innovation may introduce large pulp mills, or smelters which are recommended and sited by foreign experts in pulping and metallurgy, but seldom considered by ecologists. In the future, when pollution control has raised costs in developed countries, there will be strong inducements for the developing nations to maintain their competitiveness by unrestrained pollution.

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